PINBALL MACHINE
SERVICE AND OPERATION MANUAL



WARNING

IMPORTANT HEALTH WARNING: PHOTOSENSITIVE SEIZURES - A very small percentage of people may experience a seizure when exposed to certain visual images, including flashing lights or patterns. Even people with no history of seizures of epilepsy may have an undiagnosed condition that can cause “photosensitive epileptic seizures” due to certain visual images, flashing lights or patterns. Symptoms can include light-headedness, altered vision, eye or face twitching, jerking or shaking of arms or legs, disorientation, confusion, momentary loss of awareness, and loss of consciousness or convulsions that can lead to injury from falling down or striking nearby objects.

IMMEDIATELY STOP PLAYING AND CONSULT A DOCTOR IF YOU EXPERIENCE ANY OF THESE SYMPTOMS.

Stern Pinball machines are assembled in Melrose Park, Illinois, USA; each pinball machine has unique characteristics that make it a one-of-a-kind American-made product. Each machine will have variations in appearance resulting from differences in the machine’s particular wood parts, individual silk screened art and mechanical assemblies. Stern Pinball has inspected each game element to insure it meets our quality standards.

Games configured for North America operate on 60 cycle electricity only. These games will not operate in countries with 50 cycle electricity (Europe UK, Australia).

1-800-KICKERS - PARTS.SERVICE@STERNPINBALL.COM
WWW.STERNPINBALL.COM - FACEBOOK.COM/STERNPINBALL

KISS PRO

KISS PRO #500-55H1-01
MANUAL #780-50H1-01

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SPIKE PINBALL SOFTWARE UPDATE INSTRUCTIONS

1. Obtain game software update file (filename ends in ".spk") from www.sternpinball.com or from authorized Stern distributor.
2. Place game software update file (".spk") in root directory of a blank FAT32-formatted USB flash drive
3. Use backbox power switch to turn off game
4. Plug in USB flash drive to CPU board USB connector (CN20 or CN21). Refer to www.sternpinball.com
5. Turn on game
6. The game will automatically begin software update
7. Select the correct .spk update file from list.
8. Press Enter on the service switches to start update
9. When the display indicates "Update Complete", turn off game
10. Remove USB flash drive from CPU board
11. Turn game on to complete the update and play pinball!
12. Detailed instructions and troubleshooting tips are available in the game manual, www.sternpinball.com and authorized Stern distributors.

1. SETUP AND MOVING

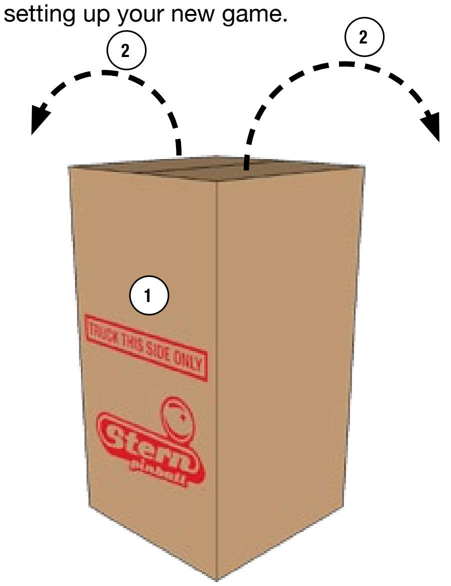
1.1 FIRST-TIME SETUP INSTRUCTIONS

Your brand new Stern Pinball Machine is carefully packed for safety and security. For your safety, exercise caution and use the correct tools and sufficient help when setting up your new game.

TOOLS REQUIRED

- 5/8” Socket Wrench
- Utility Knife
- Snips
- A helper

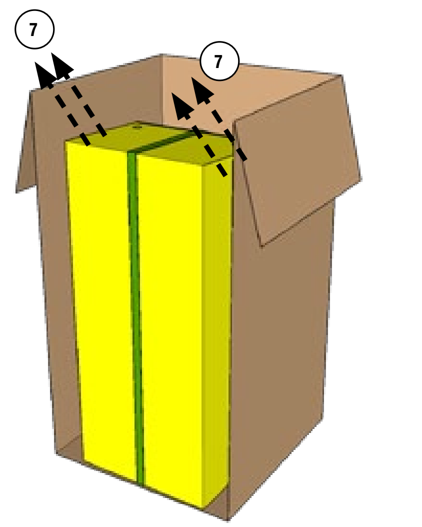
CAUTION: AT LEAST TWO (2) PEOPLE ARE REQUIRED TO MOVE AND MANEUVER THE GAME. USE PROPER MOVING EQUIPMENT AND EXTREME CARE WHILE HANDLING. STERN PINBALL MACHINES WEIGH OVER 250LBS BOXED.



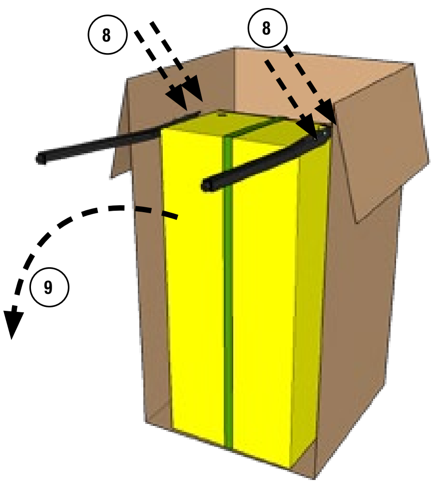
1. Locate the side labeled “TRUCK THIS SIDE ONLY”. The bottom of the game faces this side.
2. Open the top box flaps by pulling hard in an upward motion on each flap. If the flaps are taped, cut the tape first, taking care to avoid the box staples.



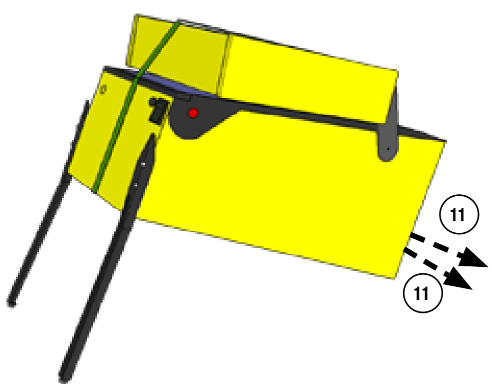
3. Remove the four (4) foam pieces and two (2) narrow box tubes which contain the four (4) identical legs with levelers.
4. DO NOT CUT STRAPPING YET. Keep backbox secured in the down position.
5. With the utility knife, carefully cut down the left and right corners of the box.



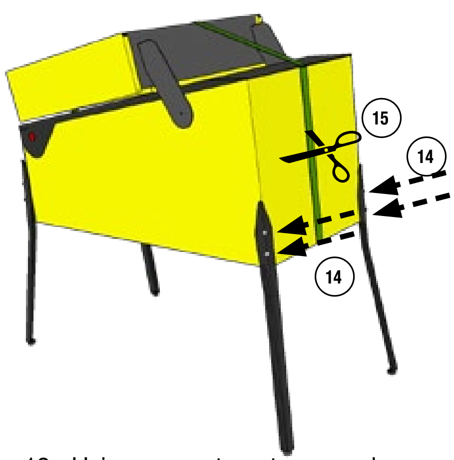
6. Let the face fall forward and remove the entire side by carefully cutting the bottom.
7. With the game still in its folded position, use a ⅝” wrench to loosen and remove the 2 leg bolts on each side of the front cabinet. Ensure the leg levelers are screwed all the way in to the legs.



8. Install front legs using the bolts removed from Step 5. Secure tightly.
9. Use a helper to carefully set the game down on the front legs.

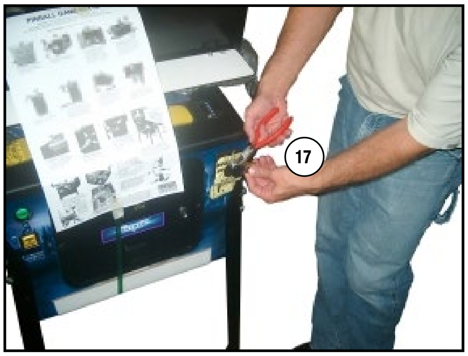


10. Set aside the open box.
11. With the ⅝” socket wrench, loosen and remove the 2 leg bolts on each side of the rear cabinet, 4 total.

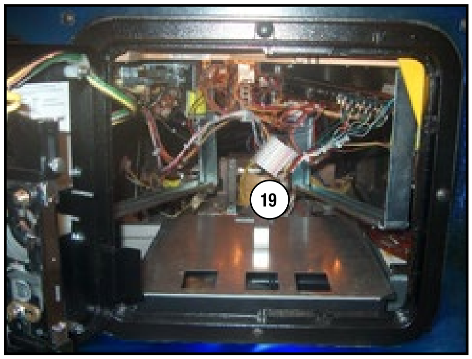


12. Using supports or two people, prop the rear of the cabinet up.
13. Ensure the rear leg levelers are screwed all the way into the legs.
14. Install rear legs using the 4 bolts removed from step 11.

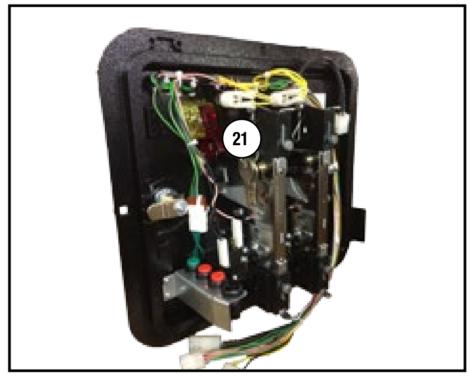
FIRST-TIME SETUP CONTINUED



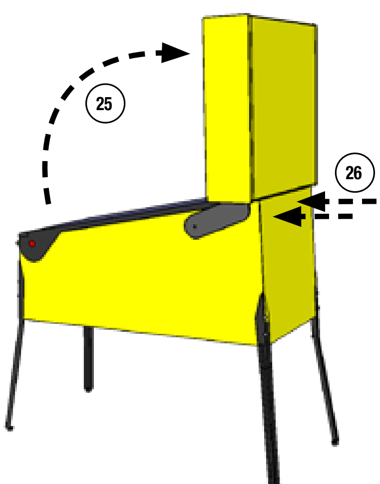
15. Cut nylon strapping and remove protective strap corner guards
16. Locate the factory keys, either on the shooter rod or taped to the playfield glass.
17. Using the snips, cut the tie-wrap securing the keys if required. One set of keys is for the front coin door, the other set of keys is for accessing components in the backbox



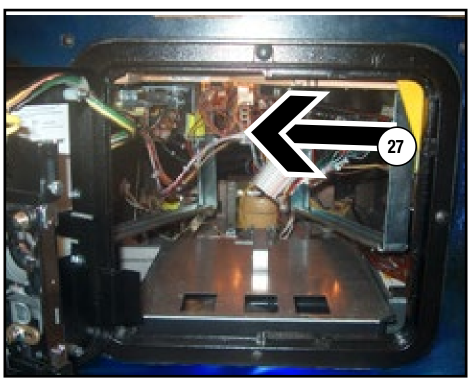
18. Open the front coin door.
19. Reach into the game and remove the retaining clip at the rear of the cash box.
20. Remove the cash box lid by sliding it toward you.



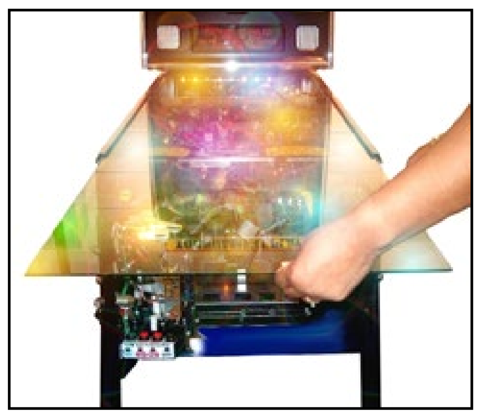
21. Store the backbox keys, if desired, on the metal hook located in the coin door.
22. Locate and remove the pinballs, plumb bob, and backbox bolts from the cash box.
23. Replace the cash box lid and retaining clip for future use.



24. Locate the two (2) backbox bolts in the cash box.
25. Carefully raise backbox to upright position while ensuring that cables are not pinched.
26. Use the ⅝" wrench to Install the two (2) backbox bolts to secure the backbox as indicated on the back of the cabinet.



27. Reach inside the cabinet and move and hold the yellow top molding lock handle to the left.
28. Remove the front top molding and then release the handle.



29. Remove the playfield glass by sliding it toward you and carefully place it in a safe location. Remove all playfield shipping tie downs, shipping blocks, and packing foam, and follow any game-specific unpacking instructions included in the playfield, if present.

CAUTION: PLAYFIELD GLASS IS MADE FROM HIGH-STRENGTH TEMPERED GLASS. TEMPERED GLASS IS SENSITIVE TO EXTREME TEMPERATURE SHIFTS AND CORNER NICKS, WHICH CAN CAUSE THE GLASS TO FAIL CATASTROPHICALLY. TAKE CARE TO STORE THE GLASS ON A SOFT, ROOM-TEMPERATURE SURFACE AND PREVENT THE CORNERS FROM BEING DAMAGED.

FIRST-TIME SETUP CONTINUED

30. If pinballs were already installed into the lower ball trough, remove them before lifting the playfield.
31. Raise the playfield and rest it against the backbox.
32. Grasp the lower arch between the flippers, and firmly but gently pull directly up to raise the playfield 8-12 inches.
33. While holding the playfield up, pull the playfield toward you until the two playfield supports are over the front edge of the cabinet.
34. Rest the playfield on the front edge of the cabinet.
35. Visually inspect all cabinet cables and connector terminations; ensure no wires or cables are pinched and that cable harnesses are not pulled tight.
36. Locate the plumb bob in the parts bag in the cash box
37. Slide plumb bob onto the hanger wire. Note: the vertical position of the plumb bob affects tilt sensitivity - higher makes the game more sensitive to tilting.
38. Tighten the Thumb Screw finger-tight.
39. Install the correct number of pinballs. Refer to the decal on the lock down assembly for the correct number of pinballs.

LOCATING, LEVELING, AND FINAL SETUP

1. Select a location that is indoors, out of direct sunlight, and climate controlled. Excessive moisture/humidity can cause long-term damage to your game.
2. Adjust the front or rear levelers as necessary to position the playfield level bubble, located on the front right of the playfield next to the shooter lane, to float between the two (2) black lines. This will place the playfield at the recommended 6.5° pitch. Playfield angles greater than 6.5° can be achieved by turning out the rear leg leveler(s) for increased difficulty and faster gameplay.
3. Use a pinball to roll down the center of the playfield for side-to-side leveling, or use an external bubble level, digital level, or smartphone level app.
4. Plug into a grounded outlet and check for proper operation through DIAGNOSTICS.
5. Check the coin door: With the door closed, insert coins to verify proper operation.
6. Play game: Check for satisfactory operation and adjust game volume (push the Red Buttons inside the Coin Door).
7. If desired, perform any game diagnostics, game adjustments, and pricing settings at this time.

1.2 TRANSPORTING THE GAME

When transporting the game, such as in the back of a truck or with a hand truck, the game's backbox must be secured to prevent damage to the side rails.

CAUTION

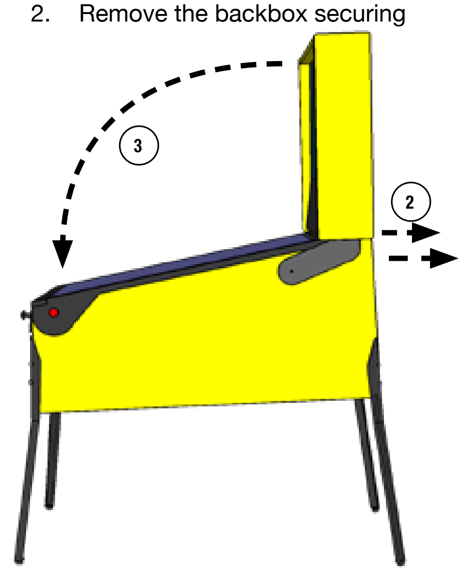
NEVER TRANSPORT THE GAME IN MOVING VEHICLE WITH THE BACKBOX RAISED! TWO PEOPLE ARE REQUIRED TO REMOVE THE LEGS!

1. SECURE THE BACKBOX

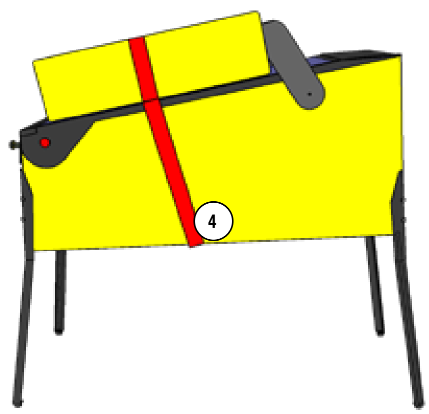
TOOLS REQUIRED

- **STRAP (500LB OR GREATER)**
- **A HELPER**
- **HAND TRUCK**

1. Ensure that the pinballs are removed from the playfield, and secure any free-moving mechanisms that may get damaged in transport
2. Remove the backbox securing bolts



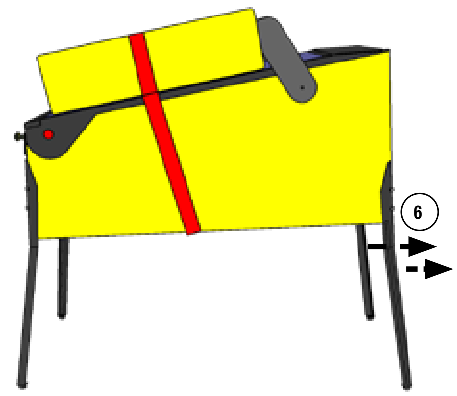
3. Carefully lower the backbox onto the side rails. Use a piece of cardboard or suitable padding between the backbox and the game.
4. Securely strap the back box to the game



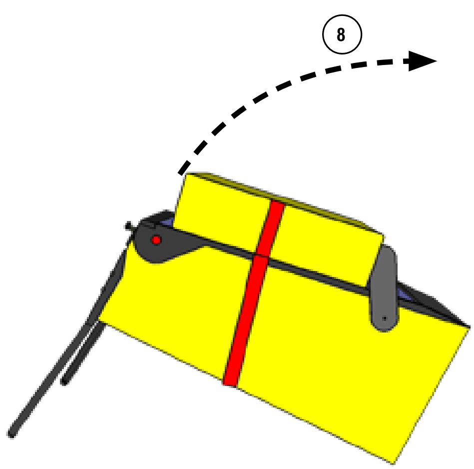
5. The game may be transported with the legs on. If the legs must be removed, follow the remaining steps.

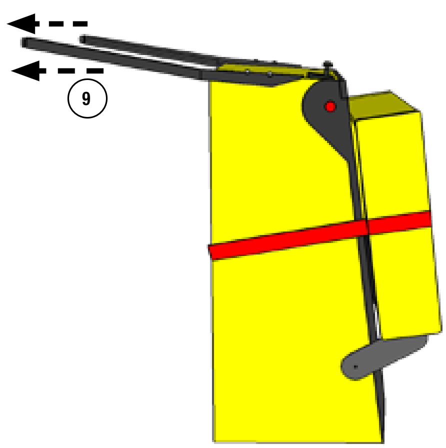
2. REMOVE THE LEGS AND STAND UP

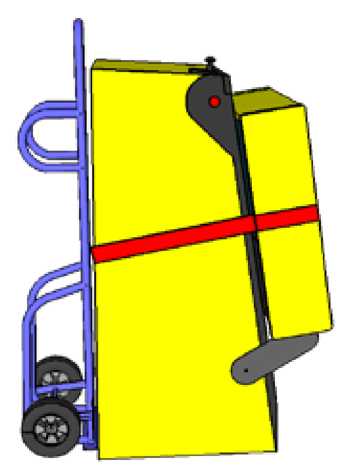
6. Remove the legs, rear legs first. Use a stool or a friend to support the rear of the game.



7. Rest the rear of the game on the ground.
8. Stand the game up on its back.
9. Remove the front two legs.







10. Secure all loose parts and transport with a hand truck in the upright position.

1.3 MAINTENANCE

REGULAR MAINTENANCE - (MONTHLY/500 GAMES)

- Remove the playfield glass
- Enter the software diagnostics menu, start lamp test, then clean and wax the playfield.
- While cleaning the playfield, identify and repair malfunctioning lights, loose parts, cracked plastics and worn rubber parts.
- While in diagnostics, enter the switch test (Select the "SW" Icon, then "TEST" Icon).
- Use a pinball to actuate all switches and verify the correct switch registers with the switch test.
- The game will play a sound to confirm the switch.
- Lift the playfield and inspect all assemblies for loose parts, broken wires or excessive wear. Look at the bottom of the cabinet for any parts that may have worked loose, then find the source.
- Check all coin door mechanisms and bill acceptor (if installed) for proper operation
- Play the game to ensure all coils and features are working
- Check the playfield to ensure it is level and set to the proper pitch using the bubble level on the right side wood rail.
- Check game audits: Replay % and Ball Time and note abnormal values which can indicate problems.
- Ensure game volume is set appropriately for the location.
- Clean both sides of the playfield glass and reinstall.
- Check and clean pinballs and replace if excessively worn or scuffed. Dirty pinballs accelerate game wear.

OVERHAUL MAINTENANCE (5000 GAMES)

- Verify latest game software is installed
- Check flippers for excessive wear. Excessive flipper sloppiness (vertical or horizontal) or weakness indicates a flipper rebuild is required.
- Clean machine inside and out and check leg levelers for free operation.
- Visual check for loose or broken playfield and cabinet parts and repair as necessary.
- Electrical check: Plug into grounded outlet and check for proper operation through DIAGNOSTICS.
- Replace worn or dirty rubbers.
- Replace pinballs.
- Check all playfield switches with a pinball.
- Check all settings (refer to manual for factory settings).
- Check coin door: With door closed, insert coins to verify proper operation.
- Check for proper adjustment of the plumb bob tilt.
- Play game: Check for satisfactory operation.

COMMON PINBALL TOOLS

- Common nut drivers (¼”, 5/16”, 11/32", ⅜”)
- Phillips screw driver
- Standard Allen wrench/Hex key set
- ⅝” Socket with ratchet
- Adjustable wrench (5/8" & 9/16")
- 6" Torpedo Level (or use a pinball
- Flashlight or headlampv
- Soldering Iron (60w with flat tip), lead-free solder
- Wire cutter
- Wire stripper
- Long nose (“needle nose”) pliers

1.4 MAINTENANCE KITS

Description	Part Number
KISS Pro Maintenance Kit • 8 oz pinball playfield wax (Novus # 2) (675-0003-01) • Standard Pinball (260-5000-00) • Cleaning Cloth • All Playfield Rubber Rings • Spare Fuses	502-6002-H1
KISS Pro Deluxe Maintenance Kit • All standard kit items, plus: • Flipper rebuild kits, Left and Right (500-6307-10,-00)	502-6003-H1
KISS Playfield Plastics Kit	803-5000-H1
KISS Playfield Decals Kit	802-5000-H1
KISS Playfield Decals Kit (Germany)	802-5000-H1-GER
KISS Pro Cabinet Decal Left	820-66H1-01
KISS Pro Cabinet Decal Left (Germany)	820-66H1-01G
KISS Pro Cabinet Decal Right	820-66H1-02
KISS Pro Cabinet Decal Right (Germany)	820-66H1-02G
KISS Pro Cabinet Decal Left	820-66H1-03
KISS Pro Cabinet Decal Left (Germany)	820-66H1-03G
KISS Pro Cabinet Decal Right	820-66H1-04
KISS Pro Cabinet Decal Right (Germany)	820-66H1-04G
KISS Pro Cabinet Decal Front	820-66H1-05
KISS Pro Cabinet Decal Front (Germany)	820-66H1-05G
KISS Pro Playfield, Bare	830-5000-H1
KISS Pro Playfield, Bare (Germany)	830-5000-H1G
KISS Pro Translite	830-52H1-01
KISS Pro Translite (Germany)	830-52H1-GER

1.5 COMMON PARTS

Description	Part Number
8 oz Pinball Playfield wax (Novus # 2)	675-0003-01
Standard Pinball, 1-1/16 in	260-5000-00
Flipper Rebuild Kit Left (Standard)	500-6307-10
Flipper Base Plate Kit Left	515-6617-01
Flipper Rebuild Kit Right	500-6307-00
Flipper Base Plate Kit Right	515-6617-00

2. SPIKE SYSTEM AND NODE GUIDE

2.1 SPIKE SYSTEM OVERVIEW

The SPIKE Pinball system is a rugged, distributed, and embedded platform custom-designed for the rigors of the pinball machine environment. SPIKE takes advantage of modern technologies to deliver an immersive pinball experience that supports modern features, reduces cabling, and increases serviceability and reliability.

A Stern Pinball machine based on the SPIKE system will have at least two nodes networked together with the SPIKE node bus, a custom industrial pinball control bus that is designed around industry standards and optimized for the pinball environment. The primary CPU node is networked to one or more input/output nodes over standard Category 5 UTP (unshielded twisted pair) ethernet cabling.

There are five primary types of nodes that are found in the game.

- CPU node (Node 0) - The primary node that controls other nodes in the system. Contains the primary game software for the system and provides SPIKE node bus power for other nodes.
- Cabinet 48V node (Node 1) - Specialized node with specific inputs and outputs for coin doors, tilt mechanisms, and other bottom-cabinet devices.
- 48V playfield node - Controls high power devices such as coils and flashers, and also supports a few switch and low-power outputs. Powered by the system 48V power supply.
- Light and switch node - High-density switch and low-power LED outputs, bus-powered from the node bus. These boards contain as many 32 switch inputs and light outputs.
- Node extensions - These sub-nodes add additional low-power input and outputs to a specific Power or I/O node and are connected with simple serial bus.

2.2 NODE BUS CABLING

The SPIKE node bus utilizes standard Ethernet-style RJ45 8-pin modular jacks, and off-the-shelf Category 5e or better ethernet cabling. The node bus is electrically different from Ethernet and does not not utilize Ethernet or TCP/IP protocols or signaling standards. SPIKE nodes are not compatible with standard computer networking equipment.

CAUTION: Plugging a SPIKE Node or CPU board into a standard Ethernet port may damage one or both devices and void your warranty.

2.3 SYSTEM POWER

The SPIKE System is powered from an 48V DC power supply bus. Each SPIKE node converts this voltage to lower voltages required by the node and its specific components. A SPIKE 48V node typically controls high-power outputs such as game coil mechanisms and high-brightness LEDs. These powered nodes are supplied directly with 48V system power. SPIKE standard I/O nodes are low-power nodes that read switch inputs and output to standard-brightness LEDs. Standard I/O nodes use the node bus power, which is supplied by the main CPU node over the node bus modular jack connectors.

COIN-DOOR SAFETY INTERLOCK

To protect the system and for user safety, power to the playfield is disabled when the front coin door is opened. 48V system power and 9V node bus power is disabled to all playfield components until the switch is closed.

2.4 SPIKE NODE ADDRESSES

Each SPIKE node has a unique address ranging from 0 to 15. Not all addresses are used in all games. Nodes can be of the same part number, so the address is specified on the DIP switches on each node. When replacing a node, be certain that the correct address is set. Nodes can have 3-position and 4-position DIP switches. Refer to the appropriate table to set the address for each type of Node. The correct address for a node can be found in the SPIKE node reference section of the manual or in the game diagnostic software. Address 0 is reserved for the backbox CPU node, where the game software resides. Address 1 is reserved for the cabinet node, located inside the coin door. These two nodes do not have DIP switches as their address is not configurable.

Address	1	2	3
8	OFF	OFF	OFF
9	OFF	OFF	ON
10	OFF	ON	OFF
11	OFF	ON	ON
12	ON	OFF	OFF
13	ON	OFF	ON
14	ON	ON	OFF
15	ON	ON	ON

Figure 2.4.1. SPIKE node addresses for nodes with 3-position DIP switches. Addresses 0-7 are not used by SPIKE nodes with 3-position DIP switches.

Address	1	2	3	4
8	OFF	OFF	OFF	OFF
9	OFF	OFF	ON	OFF
10	OFF	ON	OFF	OFF
11	OFF	ON	ON	OFF
12	ON	OFF	OFF	OFF
13	ON	OFF	ON	OFF
14	ON	ON	OFF	OFF
15	ON	ON	ON	OFF

Figure 2.4.2. SPIKE node addresses for nodes with 4-position DIP switches. Addresses 0-7 are reserved for fixed-function nodes and do not require configuration.

2.5 SPIKE NODE PROGRAMMING

The SPIKE nodes are smart nodes that have on-board processors and run embedded code. The nodes are programmed

SPIKE SYSTEM AND NODE GUIDE CONTINUED

automatically by the CPU node whenever software updates are installed to the CPU. When replacing a node, the CPU node will detect and update the node to the latest software with no user intervention. Always replace nodes with the power to the game turned OFF.

2.6 SPIKE SYSTEM TERMINOLOGY

MULTI GENERAL ILLUMINATION LIGHTING

General Illumination Lighting is two or more lights powered by one control source. These are often a number of LEDs connected in parallel and the system controls these as one large LED. A missing LED will not affect these circuits, however a shorted LED can cause the entire string of LEDs to turn off.

SINGLE LIGHTS

Single lights and LEDs are direct-controlled from SPIKE node boards. A common power source is grounded by individual transistors to turn individual LEDs on and off. Groups of LEDs, usually by node connector, share a common power source, so if a group of LEDs is out, check the wiring for the power source.

FLASHERS

SPIKE games treat flashers the same as single LEDs that draw more power. Flashers are controlled from the same circuits that power regular lights.

DRIVERS

A driver is a circuit that controls a high power-device such as a coil, magnet, or motor. Each device has a common 48V power source that is then connected to ground by a dedicated control transistor. Each driver is protected against shorting, static electricity, and over-current conditions. Take caution as 48V is always present on a device even when it is not energized.

OPTOS

Certain types of optical switches (“optos”) require external signal conditioning. For these optos, they will interface to a SPIKE node via an opto signal conditioning board. Other optical switches connect directly to the Spike node board.

System Protections

CAUTION: Unless explicitly directed by an Authorized Stern Repair technician, perform ALL work on your pinball machine with the power disabled!

INPUT/OUTPUT PROTECTIONS

SPIKE features built-in short-circuit, static electricity, and other protections to maximize reliability. If an LED, coil or other device shorts, it will be disabled but will not shut down the entire system in most circumstances. Groups of LEDs, coils, and switches often share common power supplies or other circuits, so it is possible that a bad device will affect the group of related devices and require removal or repair to fix the group. The system diagnostics will inform the technician of shorted or otherwise malfunctioning devices whenever possible. While the system is protected against permanent damage, it is strongly recommended to repair or replace these bad components as soon as possible to minimize downtime and maximize game earnings.

FUSES

Nodes that have 48 V power are fused individually. Fuse voltage ratings are a safety rating and always must be higher than the circuit the fuse is protecting. Never replace a fuse with a lower voltage-rated fuse. Fuse current ratings must be replaced with the same current value. A higher current value fuse could cause catastrophic failures, and a lower-value fuse will cause premature fuse failures.

Common fuses

Fuse Rating (Amps)	Type	Part Number
3/4 A	Slow Blow MDL	200-5000-17
3 A	Slow Blow MDL	200-5000-08
4 A	Slow Blow MDL	200-5000-06
5 A	Slow Blow MDL	200-5000-01
7 A	Slow Blow MDL	200-5000-03
8 A	Slow Blow MDL	200-5000-05

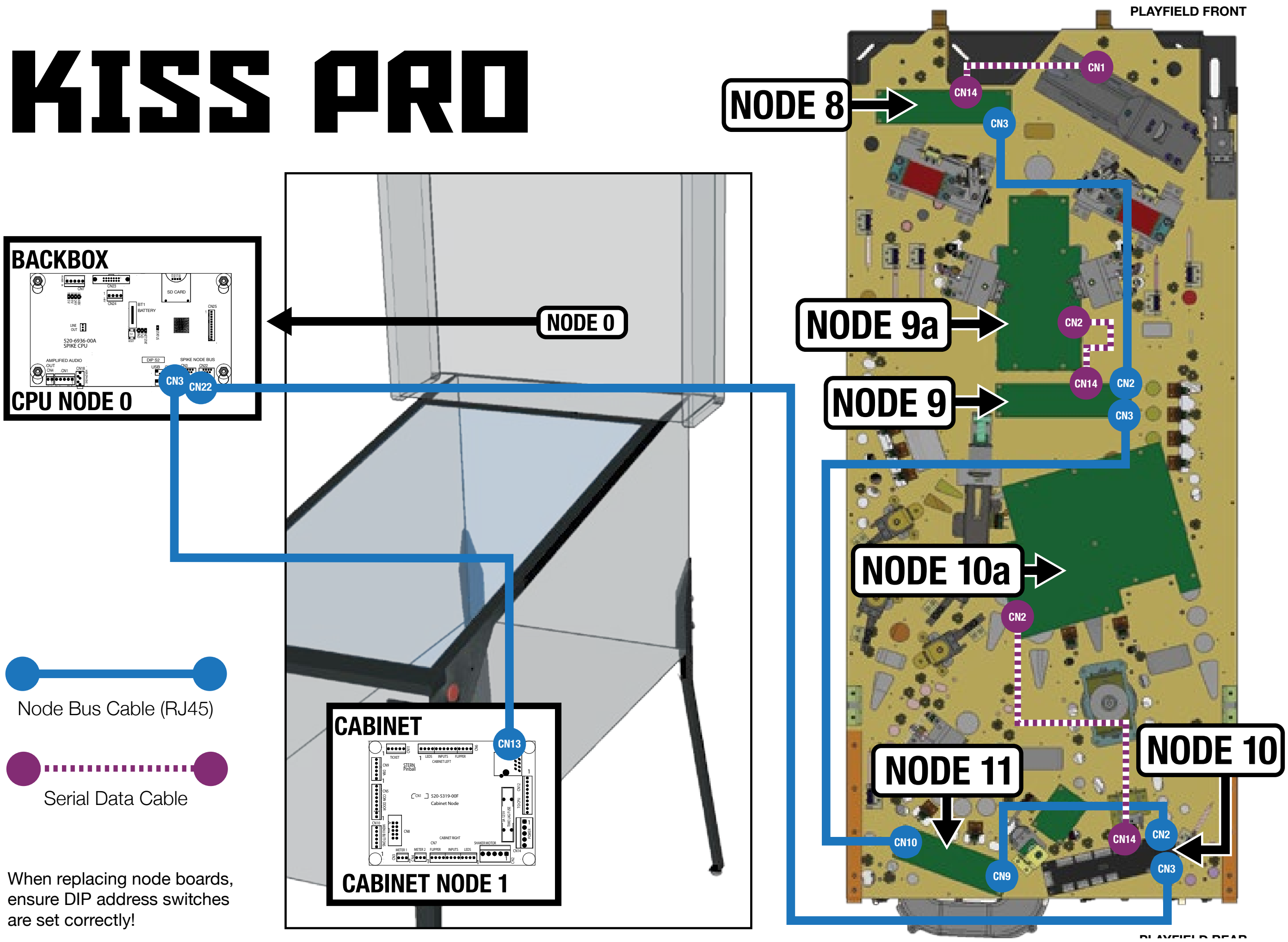
CAUTION: Always replace fuses with the exact current specifications.

2.7 COMMON SPIKE NODE BOARDS

Description	Type	Part Number
SPIKE CPU Node	Node	520-6936-00
SPIKE CPU Node w/ Video Out Support (Backward compatible with -00)	Node	520-6936-10
Cabinet Node	Node	520-5319-00
48V 8-Driver Node	Node	520-6935-00
48V 4-Driver Node	Node	520-5329-00
SPIKE 32 Light and Switch Node	Node	520-5322-00
Trough Serial Opto Receiver Extension	Extension	520-5345-00

3. LIGHT, SWITCH, AND DRIVER REFERENCE

KISS PRO



When replacing node boards, ensure DIP address switches are set correctly!

3.1 SPIKE NODE BOARDS

ID	DIP SW1 Address	Description	Location	Part Number
0	n/a	SPIKE CPU Node	Backbox	520-6936-00
1	n/a	Cabinet Node	Cabinet	520-5319-00
8	OFF-OFF-OFF-OFF	Lower Playfield 48V 8-Driver Node	Lower playfield	520-6935-00
8a	n/a	Trough Serial Opto Receiver Extension	Lower playfield ball trough	520-5345-01
9	OFF-OFF-ON-OFF	Mid Playfield 48V 8-Driver Node	Mid playfield	520-6935-00
9a	n/a	Star Grid LED Extension	Lower playfield	520-6969-00
10	OFF-ON-OFF-OFF	Upper Playfield 48V 8-Driver Node	Upper playfield	520-6935-00
10a	n/a	Star LED Extension	Mid playfield	520-6970-00
11	OFF-ON-ON	Upper Playfield S/L I/O Node	Upper playfield	520-5322-00

3.2 DRIVER REFERENCE

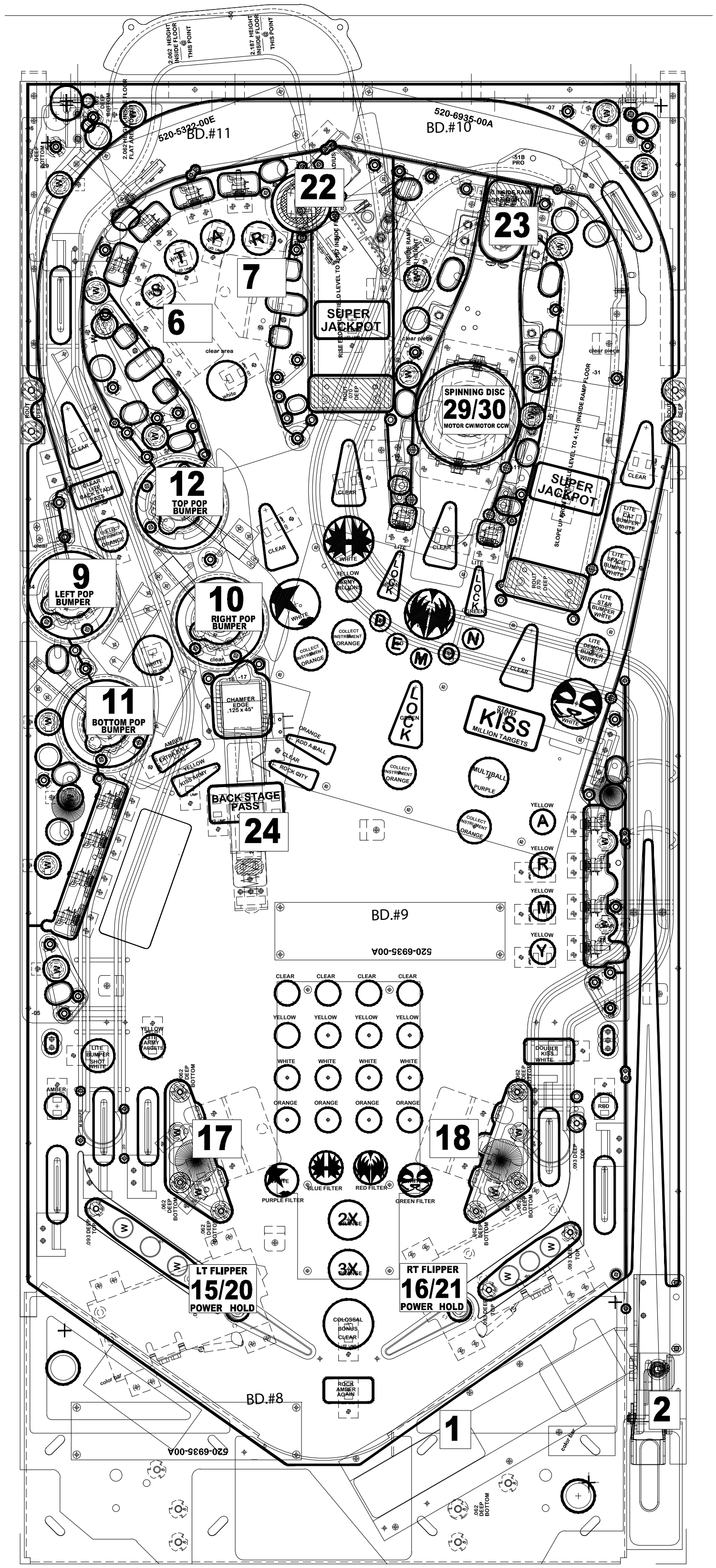


Figure 3.2.1. Playfield top component view

DRIVER REFERENCE CONTINUED

ID	Name	Node	Con-nector	Ret. Pin	Ret. Wire	Voltage	V+ Pin	V+ Color	Location	Type	Address	Part Number
1	Trough	8	CN8	5	ORG-GRY	48V	6	GRY-ORG	Playfield	Coil - 27-1500	8-DR-5	090-5004-ND
2	Auto Plunger	8	CN6	5	ORG-WHT	48V	6	GRY-ORG	Playfield	Coil - 23-800	8-DR-4	090-5001-ND
6	Up Left Sling	9	CN5	3	YEL-BLU	48V	4	GRY-BLK	Playfield	Coil - 26-1200	9-DR-0	090-5044-ND
7	Up Right Sling	9	CN7	3	YEL-GRY	48V	4	GRY-BLK	Playfield	Coil - 26-1200	9-DR-1	090-5044-ND
8	Shaker Motor	1	CN2	1	BLU	48V	5	RED	Cabinet	Motor	1-DR-0	041-5029-04
9	Left Pop Bumper	9	CN6	5	ORG-BLK	48V	6	GRY-BLK	Playfield	Coil - 26-1200	9-DR-4	090-5044-ND
10	Right Pop Bumper	9	CN8	5	ORG-BRN	48V	6	GRY-BLK	Playfield	Coil - 26-1200	9-DR-5	090-5044-ND
11	Bottom Pop Bumper	9	CN10	5	ORG-RED	48V	6	GRY-BLK	Playfield	Coil - 26-1200	9-DR-6	090-5044-ND
12	Top Pop Bumper	9	CN12	5	ORG	48V	6	GRY-BLK	Playfield	Coil - 26-1200	9-DR-7	090-5044-ND
15	Left Flipper	8	CN5	3	ORG-YEL	48V	4	GRY-ORG	Playfield	Coil - 24-850	8-DR-0	090-5083-03-ND
16	Right Flipper	8	CN7	3	ORG-GRN	48V	4	GRY-ORG	Playfield	Coil - 24-850	8-DR-1	090-5083-03-ND
17	Left Sling	8	CN12	5	ORG-BLU	48V	6	GRY-ORG	Playfield	Coil - 26-1200	8-DR-7	090-5044-ND
18	Right Sling	8	CN10	5	ORG-VIO	48V	6	GRY-ORG	Playfield	Coil - 26-1200	8-DR-6	090-5044-ND
20	Left Flipper Hold	8	CN9	3	YEL-ORG	48V	4	GRY-ORG	Playfield	Coil - 31-3500	8-DR-2	090-5083-03-ND
21	Right Flipper Hold	8	CN11	3	YEL-GRN	48V	4	GRY-ORG	Playfield	Coil - 31-3500	8-DR-3	090-5083-03-ND
22	Eject	10	CN5	3	YEL-BLK	48V	4	GRY-BRN	Playfield	Coil - 26-1200	10-DR-0	090-5044-ND
23	Vertical Upkicker	10	CN7	3	YEL-BRN	48V	4	GRY-BRN	Playfield	Coil - 23-800	10-DR-1	090-5001-ND
24	Scoop	10	CN9	3	YEL-RED	48V	4	GRY-BRN	Playfield	Coil - 23-800	10-DR-2	090-5001-ND
29	Motor-Spin Disc 1	10	10a-CN9	4	BLU-ORG	5V	1	RED	Playfield	Motor	10-LP-41	511-5190-00
30	Motor-Spin Disc 2	10	10a-CN9	5	BLU-YEL	5V	1	RED	Playfield	Motor	10-LP-42	511-5190-00
31	Meter 1	1	CN3	2	BLK	12V	1	RED	Cabinet	Digital Out	1-DR-2	500-9946-00
32	Meter 2	1	CN4	2	BLK	12V	1	RED	Cabinet	Digital Out	1-DR-3	500-9946-00
33	Ticket Dispenser	1	CN11	3		12V	1		Cabinet	Digital Out	1-DR-4	

Figure 3.3.1. Driver reference table.

3.3 SWITCH REFERENCE

	Name	Node	Node Ext	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
1	Return Lane L	11	-	CN7	3	WHT-RED	10	BLK-VIO	Playfield	Rollover	11-SW-1	500-9935-04
2	Return Lane R	11	-	CN1	6	TAN-GRN	10	BLK-ORG	Playfield	Rollover	11-SW-28	500-9935-03
3	Left Outlane	11	-	CN7	2	WHT-BRN	10	BLK-VIO	Playfield	Rollover	11-SW-0	500-9935-04
4	Right Outlane	11	-	CN1	7	TAN-BLU	10	BLK-ORG	Playfield	Rollover	11-SW-29	500-9935-04
5	Left Slingshot	8	-	CN12	4	GRY-BLU	3	BLK-GRN	Playfield	Leaf	8-SW-7	180-5231-00
6	Right Slingshot	8	-	CN10	4	GRY-VIO	3	BLK-GRN	Playfield	Leaf	8-SW-6	180-5231-00
10	Flipper Button L	8	-	CN9	2	GRY-BRN	1	BLK-GRN	Cabinet	Leaf	8-SW-2	500-5160-01
11	Flipper Button R	8	-	CN11	2	GRY-RED	1	BLK-GRN	Cabinet	Leaf	8-SW-3	500-5160-01
14	Left Orbit	11	-	CN7	5	WHT-YEL	10	BLK-VIO	Playfield	Rollover	11-SW-3	500-9935-04
15	Tournament Start	1	-	CN6	9	GRY-WHT	5	BLK-WHT	Cabinet	Micro	1-SW-12	180-5174-00
16	Trough 6	8	8a	CN14	-	-	-	-	Playfield	Opto	8a-SW-9	520-5344-00 tx 520-5345-01 rx
17	Trough 5	8	8a	CN14	-	-	-	-	Playfield	Opto	8a-SW-10	520-5344-00 tx 520-5345-01 rx
18	Trough 4	8	8a	CN14	-	-	-	-	Playfield	Opto	8a-SW-11	520-5344-00 tx 520-5345-01 rx
19	Trough 3	8	8a	CN14	-	-	-	-	Playfield	Opto	8a-SW-12	520-5344-00 tx 520-5345-01 rx
20	Trough 2	8	8a	CN14	-	-	-	-	Playfield	Opto	8a-SW-13	520-5344-00 tx 520-5345-01 rx
21	Trough 1	8	8a	CN14	-	-	-	-	Playfield	Opto	8a-SW-14	520-5344-00 tx 520-5345-01 rx

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SWITCH REFERENCE CONTINUED

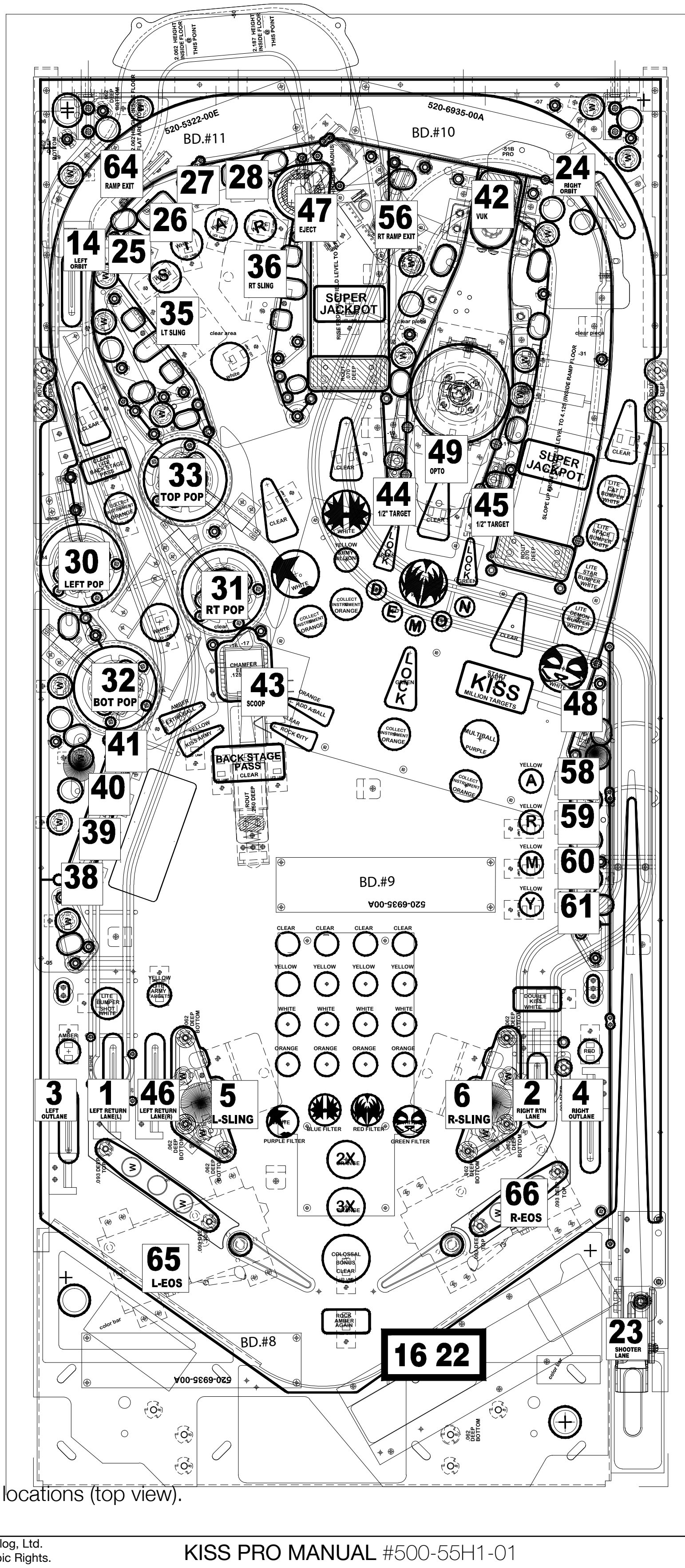


Figure 3.3.2. Playfield switch locations (top view).

SWITCH REFERENCE CONTINUED

	Name	Node	Node Ext	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
22	Trough Jam	8	8a	CN14	-	-	-	-	Playfield	Opto	8a-SW-15	520-5344-00 tx 520-5345-01 rx
23	Shooter Lane	8	-	CN6	4	GRY-WHT	3	BLK-GRN	Playfield	Rollover	8-SW-4	180-5157-01
24	Right Orbit	11	-	CN3	9	PNK-VIO	10	BLK-RED	Playfield	Rollover	11-SW-23	500-9935-03
25	(S)TAR Target	11	-	CN7	6	WHT-GRN	10	BLK-VIO	Playfield	Leaf, Target	11-SW-4	515-9783-00-00
26	S(T)AR Target	11	-	CN7	7	WHT-BLU	10	BLK-VIO	Playfield	Leaf, Target	11-SW-5	515-9783-00-00
27	ST(A)R Target	11	-	CN7	8	WHT-VIO	10	BLK-VIO	Playfield	Leaf, Target	11-SW-6	515-9783-00-00
28	STA(R) Target	11	-	CN7	9	WHT-GRY	10	BLK-VIO	Playfield	Leaf, Target	11-SW-7	515-9783-00-00
30	Left Pop Bumper	9	-	CN6	4	LGN-BLK	3	BLK-BRN	Playfield	Leaf	9-SW-4	180-5232-00
31	Right Pop Bumper	9	-	CN8	4	LGN-BRN	3	BLK-BRN	Playfield	Leaf	9-SW-5	180-5232-00
32	Bottom Pop Bumper	9	-	CN10	4	LGN-RED	3	BLK-BRN	Playfield	Leaf	9-SW-6	180-5232-00
33	Top Pop Bumper	9	-	CN12	4	LGN-ORG	3	BLK-BRN	Playfield	Leaf	9-SW-7	180-5232-00
35	Up Left Sling	9	-	CN5	2	LGN-YEL	1	BLK-BRN	Playfield	Leaf	9-SW-0	180-5231-00
36	Up Right Sling	9	-	CN7	2	LGN-BLU	1	BLK-BRN	Playfield	Leaf	9-SW-1	180-5231-00
38	4 Bank (K)ISS	10	-	CN6	4	WHT-BRN	3	BLK-BLU	Playfield	Leaf, Target	10-SW-4	515-9783-00-00
39	4 Bank K(I)SS	10	-	CN8	4	WHT-RED	3	BLK-BLU	Playfield	Leaf, Target	10-SW-5	515-9783-00-00
40	4 Bank KI(S)S	10	-	CN10	4	WHT-ORG	3	BLK-BLU	Playfield	Leaf, Target	10-SW-6	515-9783-00-00
41	4 Bank KIS(S)	10	-	CN12	4	WHT-YEL	3	BLK-BLU	Playfield	Leaf, Target	10-SW-7	515-9783-00-00
42	Verticual Upkicker	10	-	CN7	2	WHT-BLU	1	BLK-BLU	Playfield	Rollover	10-SW-1	180-5209-00
43	Scoop	10	-	CN9	2	WHT-VIO	1	BLK-BLU	Playfield	Rollover	10-SW-2	180-5057-00
44	Left Lock Target	11	-	CN5	2	LGN-BLK	10	BLK-GRY	Playfield	Leaf, Target	11-SW-8	515-9785-00-00
45	Right Lock Target	11	-	CN5	3	LGN-BRN	10	BLK-GRY	Playfield	Leaf, Target	11-SW-9	515-9785-00-00
46	Left Return Lane (R)	11	-	CN7	4	WHT-ORG	10	BLK-VIO	Playfield	Rollover	11-SW-2	500-9935-04
47	Eject	10	-	CN5	2	WHT-GRN	1	BLK-BLU	Playfield	Micro	10-SW-0	180-5186-01
48	Spinner	10	-	CN11	1	WHT-GRY	1	BLK-BLU	Playfield	Micro	10-SW-3	180-5010-04
49	Demon Entrance Opto	11	-	CN5	4	LGN-RED	10	BLK-GRY	Playfield	Opto	11-SW-10	515-0215-00 tx 515-0215-01 rx
56	Right Ramp Exit	11	-	CN3	7	PNK-GRN	10	BLK-RED	Playfield	Micro	11-SW-21	180-5087-00
58	(A)RMY Target	11	-	CN1	2	TAN-BLK	10	BLK-ORG	Playfield	Leaf, Target	11-SW-24	515-9783-00-00
59	A(R)MY Target	11	-	CN1	3	TAN-RED	10	BLK-ORG	Playfield	Leaf, Target	11-SW-25	515-9783-00-00
60	AR(M)Y Target	11	-	CN1	4	TAN-ORG	10	BLK-ORG	Playfield	Leaf, Target	11-SW-26	515-9783-00-00
61	ARM(Y) Target	11	-	CN1	5	TAN-YEL	10	BLK-ORG	Playfield	Leaf, Target	11-SW-27	515-9783-00-00
62	Start Button	1	-	CN6	10	GRY	5	BLK-WHT	Cabinet	Micro	1-SW-11	500-6388-44-LED
64	Left Ramp Exit	11	-	CN3	3	PNK-BRN	10	BLK-RED	Playfield	Micro	11-SW-17	180-5087-00
65	Left Flipper EOS	8	-	CN5	2	GRY-YEL	1	BLK-GRN	Playfield	Leaf	8-SW-0	180-5149-00
66	Right Flipper EOS	8	-	CN7	2	GRY-GRN	1	BLK-GRN	Playfield	Leaf	8-SW-1	180-5149-00
67	Left Coin	1	-	CN5	9	PNK-BRN	3	BLK	Cabinet	Micro	1-SW-16	
68	Right Coin	1	-	CN5	8	PNK-RED	3	BLK	Cabinet	Micro	1-SW-18	
69	Center Coin	1	-	CN5	7	PNK-ORG	3	BLK	Cabinet	Micro	1-SW-17	
70	Fourth Coin	1	-	CN5	6	-	-	-	Cabinet	-	1-SW-19	
71	Fifth Coin	1	-	CN5	5	-	-	-	Cabinet	-	1-SW-20	
72	Tilt Pendulum	1	-	CN6	7	WHT	5	BLK-WHT	Cabinet	Plumb Bob	1-SW-14	
73	Launch Button (Re-served)	1	-	CN7	8	PNK-BLU	5	BLK	Cabinet	Micro	1-SW-2	
76	Ticket Notch	1	-	CN11	5	-	-	-	Cabinet	-	1-SW-8	
77	Slam Tilt	1	-	CN5	4	LGN-RED	3	BLK	Cabinet	-	1-SW-21	
C1	DIP 1	0	-	-	-	-	-	-	CPU Node		0-SW-0	-
C2	DIP 2	0	-	-	-	-	-	-	CPU Node		0-SW-2	-
C3	DIP 3	0	-	-	-	-	-	-	CPU Node		0-SW-3	-
C4	DIP 4	0	-	-	-	-	-	-	CPU Node		0-SW-4	-
C5	DIP 5	0	-	-	-	-	-	-	CPU Node		0-SW-5	-

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SWITCH REFERENCE CONTINUED

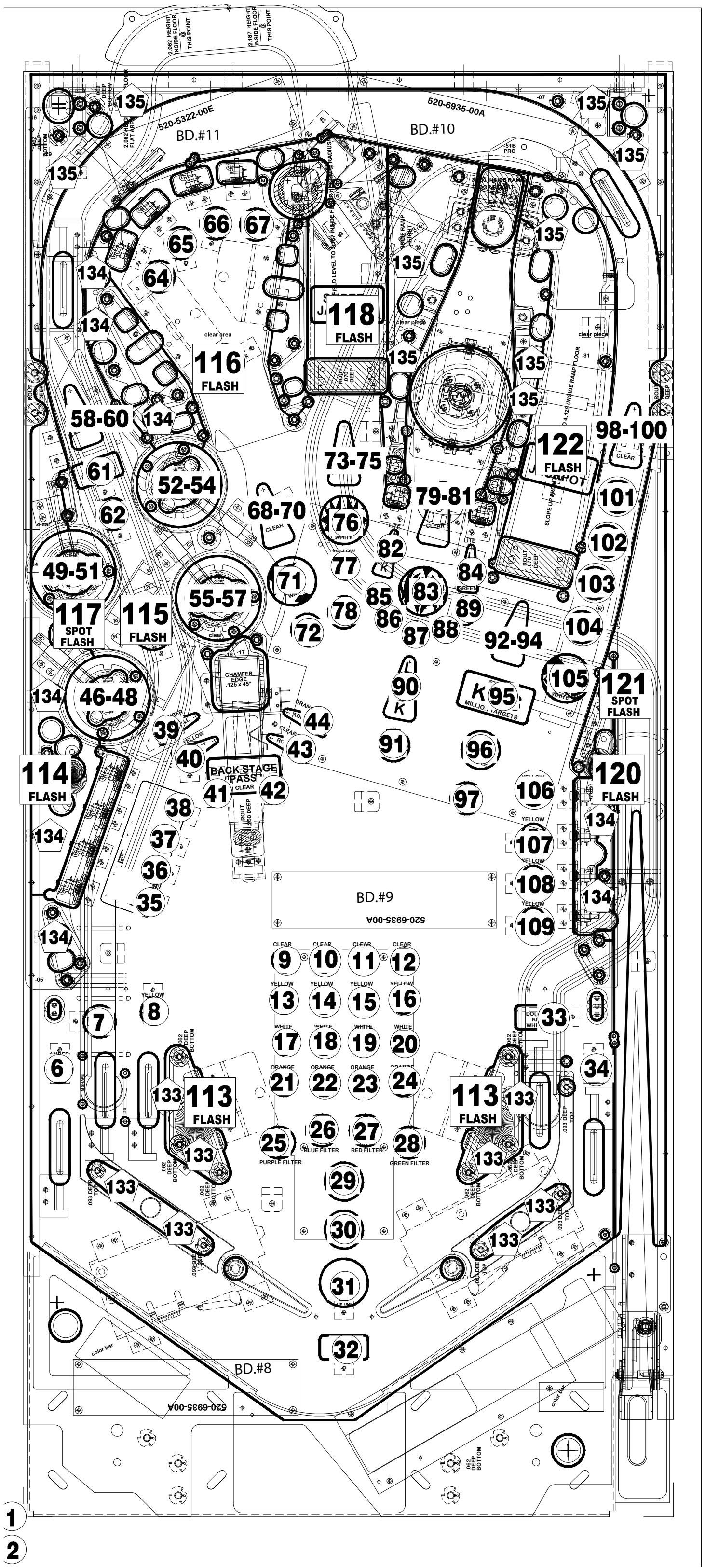
	Name	Node	Node Ext	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
C6	DIP 6	0	-	-	-	-	-	-	CPU Node		0-SW-6	-
C7	DIP 7	0	-	-	-	-	-	-	CPU Node		0-SW-7	-
C8	DIP 8	0	-	-	-	-	-	-	CPU Node		0-SW-8	-
C9	Service Select	0	-	CN25	1	LGN-GRY	11	BLK-WHT	Coin Door		0-SW-9	180-5192-04
C10	Service Plus	0	-	CN25	2	LGN-VIO	11	BLK-WHT	Coin Door		0-SW-10	180-5192-02
C11	Service Minus	0	-	CN25	3	LGN-BLU	11	BLK-WHT	Coin Door		0-SW-11	180-5192-02
C12	Service Back	0	-	CN25	4	LGN-BLK	11	BLK-WHT	Coin Door		0-SW-12	180-5192-00
C16	Power Interlock Sense	0	-	CN7	4	GRY-RED	1	BLK	Cabinet	Interlock	0-SW-16	180-5136-00

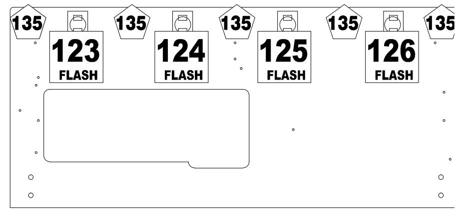
3.4 LIGHT REFERENCE

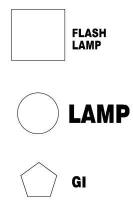
ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
1	Start Button	1	-	CN6	3	YEL BRN	1	RED	Cabinet	Feature	White	1-LP-2	112-5033-08
2	Tournament Button	1	-	CN6	2	YEL RED	1	RED	Cabinet	Feature	White	1-LP-3	112-5033-08
6	Left Outlane	11	-	CN8	8	BRN GRN	2/3	RED	Playfield	Feature	White	11-LP-28	520-5307-00
7	Left Return Lane L	11	-	CN8	9	BRN BLU	2/3	RED	Playfield	Feature	White	11-LP-29	520-5307-00
8	Left Return Lane R	11	-	CN8	10	BRN VIO	2/3	RED	Playfield	Feature	White	11-LP-30	520-5307-00
9	Bonus (K)ISS	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-39	520-6969-00
10	Bonus K(I)SS	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-36	520-6969-00
11	Bonus KI(S)S	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-27	520-6969-00
12	Bonus KIS(S)	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-30	520-6969-00
13	Bonus (A)RMY	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-45	520-6969-00
14	Bonus A(R)MY	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-33	520-6969-00
15	Bonus AR(M)Y	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-24	520-6969-00
16	Bonus ARM(Y)	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-21	520-6969-00
17	Bonus Pop Starchild	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-48	520-6969-00
18	Bonus Pop Spaceman	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-42	520-6969-00
19	Bonus Pop Demon	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-18	520-6969-00
20	Bonus Pop Catman	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-15	520-6969-00
21	Bonus Inst Starchild	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-54	520-6969-00
22	Bonus Inst Spaceman	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-51	520-6969-00
23	Bonus Inst Demon	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-9	520-6969-00
24	Bonus Inst Catman	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-12	520-6969-00
25	Bonus Starchild	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-61	520-6969-00
26	Bonus Spaceman	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-58	520-6969-00
27	Bonus Demon	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-57	520-6969-00
28	Bonus Catman	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-56	520-6969-00
29	Bonus 2X	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-59	520-6969-00
30	Bonus 3X	9	9a	CN14	-	-	-	-	Playfield	Feature	White	9a-LP-60	520-6969-00
31	Bonus Colossal	9	9a	9a-CN3	2	ORG RED	4	RED	Playfield	Feature	White	9a-LP-62	520-5307-00
32	Rock Again	9	9a	9a-CN3	3	ORG YEL	4	RED	Playfield	Feature	White	9a-LP-63	520-5307-00
33	Right Return Lane	10	10a	10a-CN8	4	BRN YEL	8	RED	Playfield	Feature	White	10-LP-61	520-5307-00
34	Right Outlane	10	10a	10a-CN8	5	BRN GRN	8	RED	Playfield	Feature	White	10-LP-62	520-5307-00
35	(K)ISS	11	-	CN8	4	BRN BLK	2/3	RED	Playfield	Feature	White	11-LP-24	520-5307-00
36	K(I)SS	11	-	CN8	5	BRN RED	2/3	RED	Playfield	Feature	White	11-LP-25	520-5307-00
37	KI(S)S	11	-	CN8	6	BRN ORG	2/3	RED	Playfield	Feature	White	11-LP-26	520-5307-00
38	KIS(S)	11	-	CN8	7	BRN YEL	2/3	RED	Playfield	Feature	White	11-LP-27	520-5307-00
39	Extra Ball	11	-	CN6	10	ORG BLU	2/3	RED	Playfield	Feature	White	11-LP-22	520-5307-00
40	KISS Army	11	-	CN6	11	ORG VIO	2/3	RED	Playfield	Feature	White	11-LP-23	520-5307-00
41	Backstage Pass LT	11	-	CN4	10	ORG BLK	2/3	RED	Playfield	Feature	White	11-LP-14	520-5307-00
42	Backstage Pass RT	11	-	CN4	11	ORG BRN	2/3	RED	Playfield	Feature	White	11-LP-15	520-5307-00

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LIGHT REFERENCE CONTINUED







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LIGHT REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
43	Rock City	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-15	520-6970-00
44	New Track	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-17	520-6970-00
46	BOT Pop bumper-RED	11	-	CN4	4	RED YEL	2/3	RED	Playfield	Feature	Red	11-LP-8	520-6971-00
47	BOT Pop bumper-GRN	11	-	CN4	5	GRN YEL	2/3	RED	Playfield	Feature	Green	11-LP-9	520-6971-00
48	BOT Pop bumper-BLU	11	-	CN4	6	BLU YEL	2/3	RED	Playfield	Feature	Blue	11-LP-10	520-6971-00
49	LT Pop bumper-RED	11	-	CN2	4	RED BRN	2/3	RED	Playfield	Feature	Red	11-LP-0	520-6971-00
50	LT Pop bumper-GRN	11	-	CN2	5	GRN BRN	2/3	RED	Playfield	Feature	Green	11-LP-1	520-6971-00
51	LT Pop bumper-BLU	11	-	CN2	6	BLU BRN	2/3	RED	Playfield	Feature	Blue	11-LP-2	520-6971-00
52	TOP Pop bumper-RED	11	-	CN4	7	RED GRN	2/3	RED	Playfield	Feature	Red	11-LP-11	520-6971-00
53	TOP Pop bumper-GRN	11	-	CN4	8	GRN	2/3	RED	Playfield	Feature	Green	11-LP-12	520-6971-00
54	TOP Pop bumper-BLU	11	-	CN4	9	BLU GRN	2/3	RED	Playfield	Feature	Blue	11-LP-13	520-6971-00
55	RT Pop bumper-RED	11	-	CN2	7	RED ORG	2/3	RED	Playfield	Feature	Red	11-LP-3	520-6971-00
56	RT Pop bumper-GRN	11	-	CN2	8	GRN ORG	2/3	RED	Playfield	Feature	Green	11-LP-4	520-6971-00
57	RT Pop bumper-BLU	11	-	CN2	9	BLU ORG	2/3	RED	Playfield	Feature	Blue	11-LP-5	520-6971-00
58	LT Orbit Arrow-RED	11	-	CN6	4	RED GRY	2/3	RED	Playfield	Feature	Red	11-LP-16	520-5333-00
59	LT Orbit Arrow-GRN	11	-	CN6	5	GRN GRY	2/3	RED	Playfield	Feature	Green	11-LP-17	520-5333-00
60	LT Orbit Arrow-BLU	11	-	CN6	6	BLU GRY	2/3	RED	Playfield	Feature	Blue	11-LP-18	520-5333-00
61	Super Bumpers	11	-	CN6	7	ORG RED	2/3	RED	Playfield	Feature	White	11-LP-19	520-5307-00
62	Collect Catman Inst	11	-	CN6	8	ORG YEL	2/3	RED	Playfield	Feature	White	11-LP-20	520-5307-00
64	(S)TAR	9	-	CN6	1	ORG BLK	2	YEL	Playfield	Feature	White	9-LP-0	520-5307-00
65	S(T)AR	9	-	CN8	1	ORG BRN	2	YEL	Playfield	Feature	White	9-LP-1	520-5307-00
66	ST(A)R	9	-	CN10	1	ORG RED	2	YEL	Playfield	Feature	White	9-LP-2	520-5307-00
67	STA(R)	9	-	CN12	1	ORG YEL	2	YEL	Playfield	Feature	White	9-LP-3	520-5307-00
68	Starchild Arrow-RED	10	10a	10a-CN7	7	RED BLU	10	RED	Playfield	Feature	Red	10-LP-49	520-5333-00
69	Starchild Arrow-GRN	10	10a	10a-CN7	8	GRN BLU	10	RED	Playfield	Feature	Green	10-LP-50	520-5333-00
70	Starchild Arrow-BLU	10	10a	10a-CN7	9	BLU	10	RED	Playfield	Feature	Blue	10-LP-51	520-5333-00
71	Starchild	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-21	520-6970-00
72	Collect Starchild Inst	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-23	520-6970-00
73	LT Ramp Arrow-RED	10	10a	10a-CN7	4	RED VIO	10	RED	Playfield	Feature	Red	10-LP-46	520-5333-00
74	LT Ramp Arrow-GRN	10	10a	10a-CN7	5	GRN VIO	10	RED	Playfield	Feature	Green	10-LP-47	520-5333-00
75	LT Ramp Arrow-BLU	10	10a	10a-CN7	6	BLU VIO	10	RED	Playfield	Feature	Blue	10-LP-48	520-5333-00
76	Spaceman	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-19	520-6970-00
77	ARMY	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-20	520-6970-00
78	Collect Spaceman Inst	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-22	520-6970-00
79	Demon Arrow-RED	10	10a	10a-CN7	1	RED GRY	10	RED	Playfield	Feature	Red	10-LP-43	520-5333-00
80	Demon Arrow-GRN	10	10a	10a-CN7	2	GRN GRY	10	RED	Playfield	Feature	Green	10-LP-44	520-5333-00
81	Demon Arrow-BLU	10	10a	10a-CN7	3	BLU GRY	10	RED	Playfield	Feature	Blue	10-LP-45	520-5333-00
82	LT Lock target	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-29	520-6970-00
83	Demon	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-27	520-6970-00
84	RT Lock target	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-26	520-6970-00
85	(D)EMON	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-30	520-6970-00
86	D(E)MON	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-31	520-6970-00
87	DE(M)ON	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-28	520-6970-00
88	DEM(O)N	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-24	520-6970-00
89	DEMO(N)	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-25	520-6970-00
90	LOCK	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-18	520-6970-00
91	Collect Demon Inst.	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-14	520-6970-00
92	RT Ramp Arrow-RED	10	10a	CN14	-	-	-	-	Playfield	Feature	Red	10-LP-32	520-6970-00
93	RT Ramp Arrow-GRN	10	10a	CN14	-	-	-	-	Playfield	Feature	Green	10-LP-33	520-6970-00
94	RT Ramp Arrow-BLU	10	10a	CN14	-	-	-	-	Playfield	Feature	Blue	10-LP-34	520-6970-00
95	Super Targets	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-16	520-6970-00

Continued on next page

LIGHT REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
96	LOVE GUN	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-8	520-6970-00
97	Lite Inst. RT ramp	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-13	520-6970-00
98	RT Orbit Arrow-RED	10	10a	10a-CN6	1	RED WHT	8	RED	Playfield	Feature	Red	10-LP-52	520-5333-00
99	RT Orbit Arrow-GRN	10	10a	10a-CN6	2	GRN WHT	8	RED	Playfield	Feature	Green	10-LP-53	520-5333-00
100	RT Orbit Arrow-BLU	10	10a	10a-CN6	3	BLU WHT	8	RED	Playfield	Feature	Blue	10-LP-54	520-5333-00
101	RT Orbit Catman	10	10a	10a-CN6	4	ORG GRY	8	RED	Playfield	Feature	White	10-LP-55	520-5307-00
102	RT Orbit Spaceman	10	10a	10a-CN6	5	ORG WHT	8	RED	Playfield	Feature	White	10-LP-56	520-5307-00
103	RT Orbit Starchild	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-11	520-6970-00
104	RT Orbit Demon	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-10	520-6970-00
105	Catman	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-9	520-6970-00
106	(A)RMY	10	10a	CN14	-	-	-	-	Playfield	Feature	White	10-LP-12	520-6970-00
107	A(R)MY	10	10a	10a-CN8	1	BRN BLK	8	RED	Playfield	Feature	White	10-LP-58	520-5307-00
108	AR(M)Y	10	10a	10a-CN8	2	BRN RED	8	RED	Playfield	Feature	White	10-LP-59	520-5307-00
109	ARM(Y)	10	10a	10a-CN8	3	BRN ORG	8	RED	Playfield	Feature	White	10-LP-60	520-5307-00
113	Sling Flash	10	10a	10a-CN8	6	YEL GRN	8	RED	Playfield	Flash	White	10-LP-63	520-6785-00
114	Mid Pfld Flash Left	11	-	CN8	11	YEL BLK	2/3	RED	Playfield	Flash	White	11-LP-31	520-6785-00
115	Pop flash	11	-	CN6	9	ORG GRN	2/3	RED	Playfield	Flash	White	11-LP-21	520-6785-00
116	STAR Flash	10	10a	10a-CN4	2	YEL BRN	5	RED	Playfield	Flash	White	10-LP-36	520-6785-00
117	Paul Flash	10	10a	10a-CN4	1	YEL RED	5	RED	Playfield	Flash	White	10-LP-35	113-5032-08
118	Left Ramp Flash	10	10a	10a-CN4	3	ORG GRN	5	RED	Playfield	Flash	White	10-LP-37	520-6785-00
120	Mid Plfd Flash Rt	11	-	CN2	11	YEL VIO	2/3	RED	Playfield	Flash	White	11-LP-7	
121	Gene Flash	10	10a	10a-CN4	4	YEL ORG	5	RED	Playfield	Flash	White	10-LP-38	113-5032-08
122	Right Ramp Flash	10	10a	10a-CN6	6	ORG BLU	8	RED	Playfield	Flash	White	10-LP-57	520-6785-00
123	Backpanel Flash 1 L	10	-	CN6	1	YEL BLK	2	YEL	Back Pnl	Flash	White	10-LP-0	520-6785-00
124	Backpanel Flash 2	10	-	CN8	1	YEL BRN	2	YEL	Back Pnl	Flash	White	10-LP-1	520-6785-00
125	Backpanel Flash 3	10	-	CN10	1	YEL RED	2	YEL	Back Pnl	Flash	White	10-LP-2	520-6785-00
126	Backpanel Flash 4 R	10	-	CN12	1	YEL ORG	2	YEL	Back Pnl	Flash	White	10-LP-3	520-6785-00
132	Coin Door GI(x2)	1	-	CN5	2	YEL	1	YEL WHT	Coin Door	G.I.	White	1-LP-1	112-5033-08
133	Pfld GI White Lower	8	-	CN13	1	WHT BLK	3	YEL BLK	Playfield	G.I.	White	8-LP-4	112-5034-08
134	Pfld GI White Mid	9	-	CN13	1	RED BLK	3	YEL RED	Playfield	G.I.	Red	9-LP-4	112-5034-08
135	Pfld GI White Upper	10	-	CN13	1	BLU BLK	3	YEL BLU	Playfield/ Back Pnl	G.I.	Blue	10-LP-4	112-5034-08
136	Coin Enable	1	-	CN8	6	BLK GRY	2	GRY RED	Coin Door	Digital Out		1-LP-0	

4. ELECTRONIC PINOUTS AND SCHEMATICS

4.1 SPIKE CPU NODE 0

520-6936-00

AUDIO PINOUTS

ID	Type	Pin	Description	Minimum Impedance	Max Power (RMS)
CN18	TRS 3.5mm Headphone Jack	Tip	Headphone Left	8 Ohms	200mW
		Ring	Headphone Right	8 Ohms	200mW
		Sleeve	Audio Ground	-	-
CN1	.156" 5-pin Header	1	Speaker Right Ground (-)	4 Ohms	-
		2	Speaker Right (+)	4 Ohms	20W
		3	n/c	-	-
		4	Speaker Left Ground (-)	4 Ohms	-
		5	Speaker Left (+)	4 Ohms	20W
CN4	.156" 2-pin Header	1	Woofer Ground (-)	8 Ohms	-
		2	Woofer Out (+)	8 Ohms	40W
CN27	.100" 3-pin header	1	Line Out Left (+)	600 Ohms	-
		2	Line Out Ground	-	-
		3	Line Out Right (-)	600 Ohms	-

Figure 3.4.3. Audio Pinouts

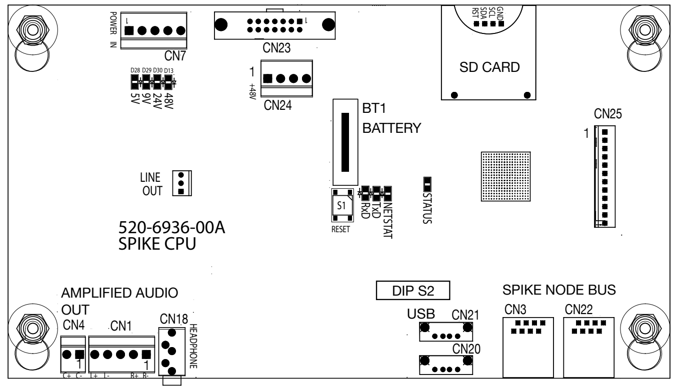


Figure 3.4.1. SPIKE CPU Node connector detail.

CONNECTORS

ID	Connector Type	Description
CN1	5-Pin .156” Header	Backbox 2-channel amplified speaker out
CN3	RJ45	SPIKE node bus - to cabinet node N1
CN4	2-Pin .156”	Cabinet 1-channel amplified speaker out
CN7	5-Pin .156” Header	48V supply from main power supply
CN18	3.5mm Stereo TRS jack	Headphone Jack
CN20	USB	USB connector - for software updates, audit dumps, and expansion modules
CN21	USB	USB connector - for software updates, audit dumps, and expansion modules
CN22	RJ45	SPIKE node bus - to playfield node, N8
CN23	14-Pin .100” Header	Dot matrix display connector
CN24	4-Pin .156” Header	5V DC and ground out to the LED display
CN25	12-Pin .100” Header	Dedicated switch inputs - service, volume switches

COMPONENTS

ID	Name
S1	Resetv Switch
S2	DIP Switches
SD CARD	For system SD card. Note: only to be removed if instructed to by Stern Service.
BT1	CR232 3V Lithium battery for game clock between power cycles

COUNTRY CODES (DIP S2)

	DIP S2							
Country	1	2	3	4	5	6	7	8
USA	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Austria	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Australia	ON	OFF	ON	ON	OFF	OFF	OFF	OFF
Belgium	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Canada 1	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
Canada 2	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
Croatia	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
Denmark	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
Finland	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
France	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
Germany	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
Greece	ON	ON	ON	ON	OFF	OFF	OFF	OFF
Italy	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
Japan	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
Middle East	ON	ON	ON	OFF	ON	OFF	OFF	OFF
Netherlands	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
New Zealand	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
Norway	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
Portugal	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
Russia	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
S. Africa	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
Spain	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
Sweden	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
Switzerland	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
Taiwan	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF
United Kingdom	OFF	ON	ON	ON	OFF	OFF	OFF	OFF

Figure 3.4.2. Country code DIP switch settings.

SPIKE CPU NODE 0 CONTINUED

STATUS LEDS

LED ID	Name	Color	Description
48V	+48V Supply In	Red	ON: Main system power is connected, OFF: No 48V system power. Check power supply connections, cables, and fuses.
24V	+24V Audio Power	Red	ON: Audio power supply is good, OFF: Audio power supply off, call tech support.
9V	+9V Node Bus Power	Red	ON: Node bus power supply is good, OFF: Node bus power supply bad, call tech support.
5V		Red	ON: Logic power supply is good. OFF: Logic power supply bad, call tech support.
TxD	Node bus transmit	Red	Node bus transmit activity
RxD	Node bus receive	Red	Node bus receive activity
Status	System status	Red	Constant double blink - game software running
Netstat	Network status	Red	Communication bridge activity

DIRECT SWITCH MAPPING (CN25)

The coin-door diagnostic switches are connected directly to the CPU node via the Cabinet Node. Note that both the CPU and Cabinet nodes are required for diagnostic switch operation.

ID	Name	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
C1	DIP 1	-	-	-	-	-	CPU Node		0-SW-0	-
C2	DIP 2	-	-	-	-	-	CPU Node		0-SW-2	-
C3	DIP 3	-	-	-	-	-	CPU Node		0-SW-3	-
C4	DIP 4	-	-	-	-	-	CPU Node		0-SW-4	-
C5	DIP 5	-	-	-	-	-	CPU Node		0-SW-5	-
C6	DIP 6	-	-	-	-	-	CPU Node		0-SW-6	-
C7	DIP 7	-	-	-	-	-	CPU Node		0-SW-7	-
C8	DIP 8	-	-	-	-	-	CPU Node		0-SW-8	-
C9	Service Select	CN25	1	LGN-GRY	11	BLK-WHT	Coin Door		0-SW-9	180-5192-04
C10	Service Plus	CN25	2	LGN-VIO	11	BLK-WHT	Coin Door		0-SW-10	180-5192-02
C11	Service Minus	CN25	3	LGN-BLU	11	BLK-WHT	Coin Door		0-SW-11	180-5192-02
C12	Service Back	CN25	4	LGN-BLK	11	BLK-WHT	Coin Door		0-SW-12	180-5192-00
C16	Playfield Power Interlock	CN7	4	GRY	5	GRY-RED	Cabinet	Interlock	0-SW-16	180-5136-00

COIN DOOR SERVICE SWITCH WIRING

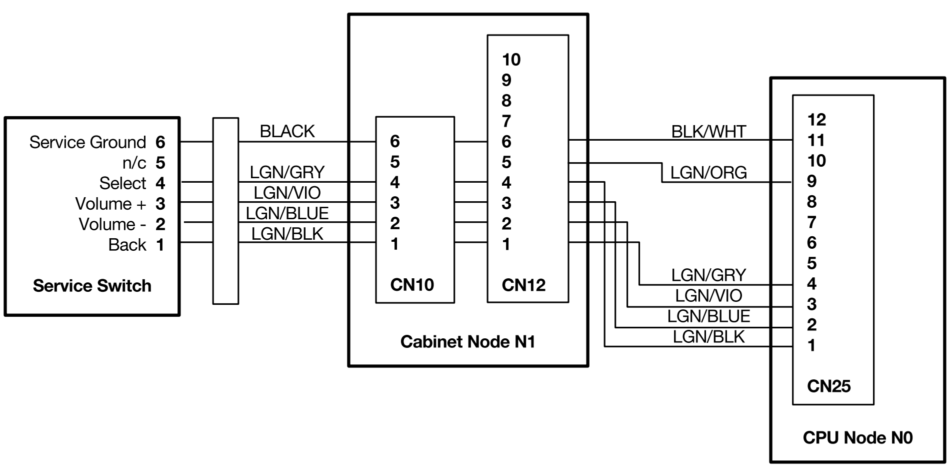
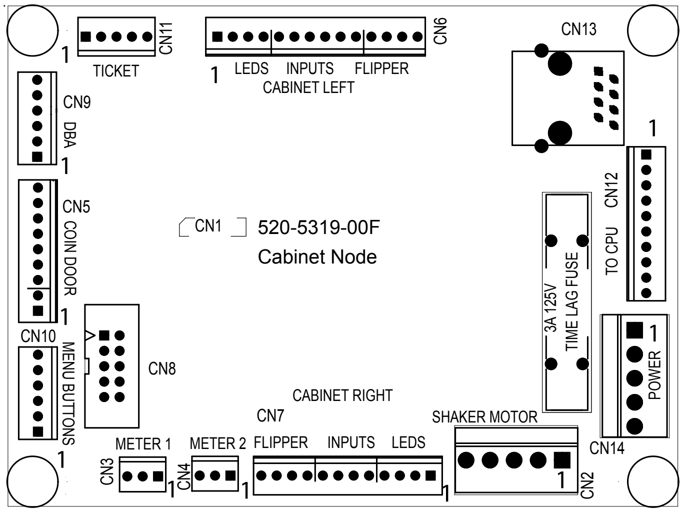


Figure 4.1.1. Service switch wiring. Note that the Cabient Node must be present and CN10 and CN12 connected for the Coin Door Service Switches to function correctly.

4.2 NODE 1 CABINET

520-5319-00

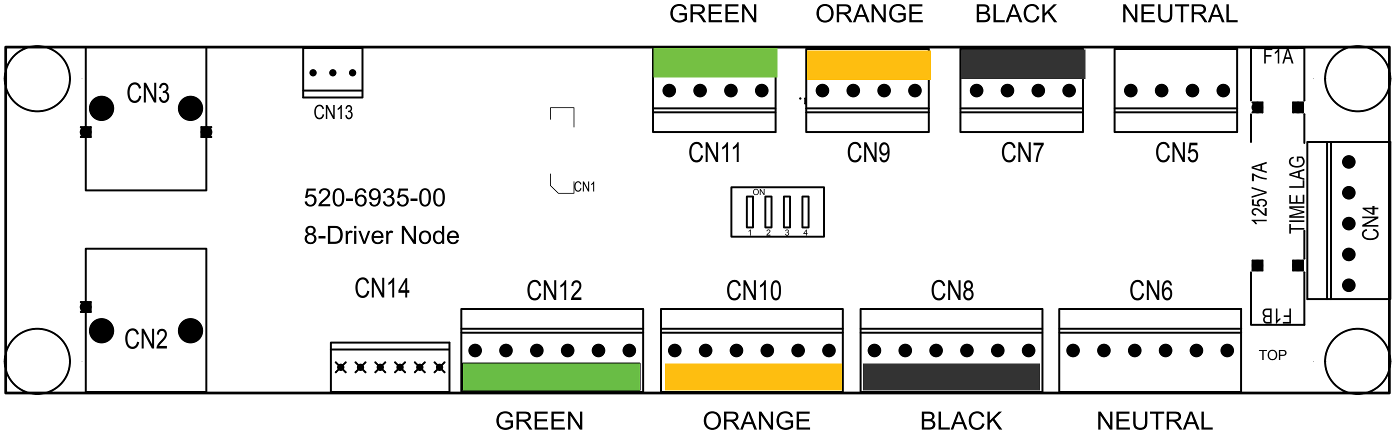


ID	Type	Pin	Description	Wire Color
CN2	.156" 5-Pin Header Shaker Motor	1	Shaker Motor (-)	BLU
		2	Shaker Motor (-)	-
		3	Shaker Motor (+)	-
		4	Key	Key
		5	Shaker Motor (+)	RED
CN3	.100" 3-Pin Header Meter 1	1	Meter 12V (+)	RED
		2	Meter (-)	BLK
		3	N/C	-
CN4	.100" 3-Pin Header Meter 2	1	Meter 12V (+)	RED
		2	Meter (-)	BLK
		3	N/C	-
CN5	.100" 9-Pin Header	1	5V Out	YEL-WHT
		2	Coin LED Out	YEL
		3	Ground	BLK
		4	Slam Tilt In	LGN-RED
		5	Coin 5	PNK-GRN*
		6	Coin 4	PNK-YEL*
		7	Coin 3	PNK-ORN*
		8	Coin 2	PNK-RED*
		9	Coin 1	PNK-BRN*
CN6	.100" 14-Pin Header Cabinet Left	1	5V LED Power	RED
		2	Start 2 LED	YEL-RED
		3	Start 1 LED	YEL-BRN
		4	Spare LED	-
		5	Ground	BLK-WHT
		6	Spare Left	-
		7	Tilt Input	WHT
		8	Door Open	-
		9	Start 2 Switch	GRY-WHT
		10	Start 1 Switch	GRY
		11	N/C	-
		12	N/C	-
		13	N/C	-
		14	N/C	-
CN7	.100" 12-Pin Header Cabinet Right	1	5V LED Power	-
		2	Plunge 2 LED	-
		3	Plunge 1 LED	-
		4	Spare LED 2	-
		5	Ground	-
		6	Spare Right In	-
		7	Plunge 2 Switch	-
		8	Plunge 1 Switch	-
		9	N/C	-
		10	N/C	-
		11	N/C	-
		12	N/C	-
CN9	.100" 6-Pin Header Dollar Bill Ac-ceptor	1	Coin Enable/DBA Inhibit (-)	-
		2	Coin Enable/DBA Inhibit (+)	-
		3	Key	Key
		4	DBA 12V	-
		5	Coin 6 / DBA Credit	-
		6	Ground	-

ID	Type	Pin	Description	Wire Color
CN10	.100" 6-Pin Header Service Switch In	1	Service Back (To Coindoor)	LGN-BLK
		2	Service Down (To Coindoor)	LGN-BLU
		3	Service Up (To Coindoor)	LGN-VIO
		4	Service Select (To Coindoor)	LGN-GRY
		5	Key	Key
		6	Service Ground (To Coindoor)	BLK
CN11	.100" 5-Pin Header Ticket Dispenser	1	12V	RED
		2	N/C	-
		3	Ticket Dispenser Enable	WHT
		4	Ground	BLK
		5	Ticket Dispenser Notch	BLU
CN12	.100" 10-Pin Header CPU Direct Switches	1	Service Back (To CPU)	LGN-BLK
		2	Service Down (To CPU)	LGN-BLU
		3	Service Up (To CPU)	LGN-VIO
		4	Service Select (To CPU)	LGN-GRY
		5	Power Present	LGN-ORG
		6	Service Ground (To CPU)	BLK-WHT
		7	N-C	-
		8	N/C	-
		9	N/C	-
		10	N/C	-
CN14	.156" 5-Pin Head-er Power Input	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY-YEL
			*Varies by country model	

4.3 LOWER PLAYFIELD 48V 8-DRIVER PINOUT NODE 8

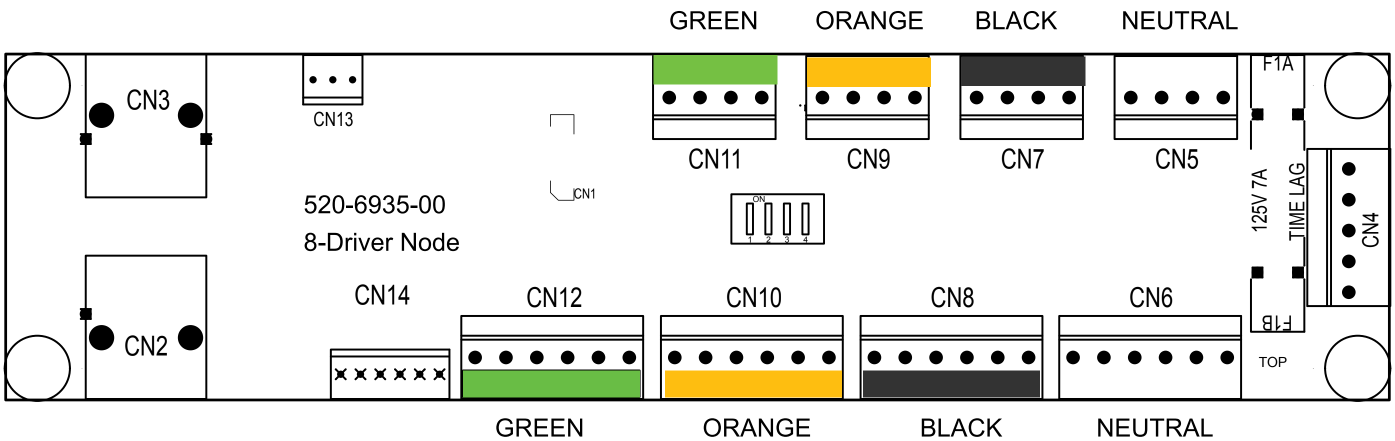
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ID	Type	Pin	Description	Wire Color
SW1	Address DIP	-	Node 8 - OFF-OFF-OFF-OFF	-
CN2	RJ45	-	SPIKE Node Bus	n/a
CN3	RJ45	-	SPIKE Node Bus	Multi
CN4	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY
CN5	.156" 4-Pin Header (White)	1	Switch Ground	BLK-GRN
		2	8-SW-0 Switch Return	GRY-YEL
		3	8-DR-0 Driver Return	ORG-YEL
		4	48V Driver Power	GRY-ORG
CN6	.156" 6-Pin Header (White)	1	8-LP-0 Light Return	-
		2	LED V+	-
		3	Switch Ground	BLK-GRN
		4	8-SW-4 Switch Return	GRY-WHT
		5	8-DR-4 Driver Return	ORG-WHT
		6	48V Driver Power	GRY-ORG
CN7	.156" 4-Pin Header (Black)	1	Switch Ground	BLK-GRN
		2	8-SW-1 Switch	GRY-GRN
		3	8-DR-1 Driver Return	ORG-GRN
		4	48V Driver Power	GRY-ORG
CN8	.156" 6-Pin Header (Black)	1	8-LP-1 Light Return	-
		2	LED V+	-
		3	Switch Ground	-
		4	8-SW-5	-
		5	8-DR-5 Driver Return	ORG-GRY
		6	48V Driver Power	GRY-ORG
CN9	.156" 4-Pin Header (Orange)	1	Switch Ground	BLK-GRN
		2	8-SW-2 Switch	GRY-BRN
		3	8-DR-2 Driver Return	YEL-ORG
		4	48V Driver Power	-
CN10	.156" 6-Pin Header (Orange)	1	8-LP-2 Light Return	-
		2	LED V+	-
		3	Switch Ground	BLK-GRN
		4	8-SW-6 Switch Return	GRY-VIO
		5	8-DR-6 Driver Return	ORG-VIO
		6	48V Driver Power	GRY-ORG
CN11	.156" 4-Pin Header (Green)	1	Switch Ground	BLK-GRN
		2	8-SW-3 Switch	GRY-RED
		3	8-DR-3 Driver Return	YEL-GRN
		4	48V Driver Power	-
CN12	.156" 6-Pin Header (Green)	1	8-LP-3 Light Return	-
		2	LED V+	-
		3	Switch Ground	BLK-GRN
		4	8-SW-7 Switch Return	GRY-BLU
		5	8-DR-7 Driver Return	ORG-BLU
		6	48V Driver Power	GRY-ORG
CN13	.100" 3-Pin Header	1	8-LP-4 GI Return (1A Max)	WHT-BLK
		2	GI Ground	-
		3	LED V+	YEL-BLK
CN14	.100" 6-Pin Header, Node Extension Bus	1	Ground	BLK
		2	DIN	VIO-BLK
		3	DOUT	-
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED
F1	Fuse	-	7A SB, 125V	n/a

4.4 NODE 9 MID PLAYFIELD 8-DRIVER 48V PINOUT

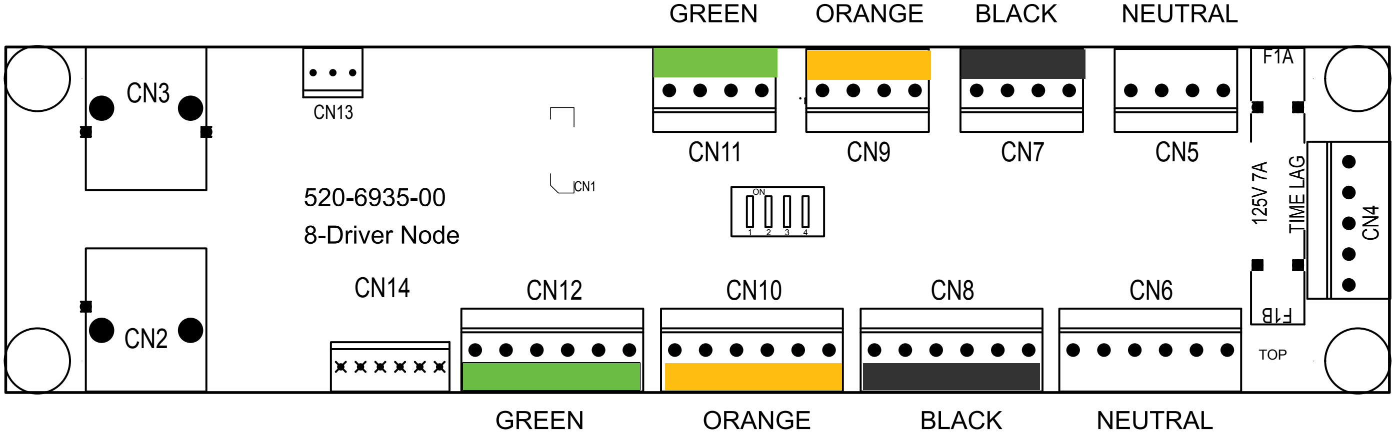
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ID	Type	Pin	Description	Wire Color
SW1	Address DIP	-	Node 9 - OFF-OFF-ON-OFF	-
CN2	RJ45	-	SPIKE Node Bus	Multi
CN3	RJ45	-	SPIKE Node Bus	Multi
CN4	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY
CN5	.156" 4-Pin Header (White)	1	Switch Ground	BLK-BRN
		2	9-SW-0 Switch Return	LGN-YEL
		3	9-DR-0 Driver Return	YEL-BLU
		4	48V Driver Power	GRY-BLK
CN6	.156" 6-Pin Header (White)	1	9-LP-0 Light Return	ORG-BLK
		2	LED V+	YEL
		3	Switch Ground	BLK-BRN
		4	9-SW-4 Switch Return	LGN-BLK
		5	9-DR-4 Driver Return	ORG-BLK
		6	48V Driver Power	GRY-BLK
CN7	.156" 4-Pin Header (Black)	1	Switch Ground	BLK-BRN
		2	9-SW-1 Switch	LGN-BLU
		3	9-DR-1 Driver Return	YEL-GRY
		4	48V Driver Power	GRY-BLK
CN8	.156" 6-Pin Header (Black)	1	9-LP-1 Light Return	ORG-BRN
		2	LED V+	YEL
		3	Switch Ground	BLK-BRN
		4	9-SW-5	LGN-BRN
		5	9-DR-5 Driver Return	ORG-BRN
		6	48V Driver Power	GRY-BLK
CN9	.156" 4-Pin Header (Orange)	1	Switch Ground	-
		2	9-SW-2 Switch	-
		3	9-DR-2 Driver Return	-
		4	48V Driver Power	-

ID	Type	Pin	Description	Wire Color
CN10	.156" 6-Pin Header (Orange)	1	9-LP-2 Light Return	ORG-RED
		2	LED V+	YEL
		3	Switch Ground	BLK-BRN
		4	9-SW-6 Switch Return	LGN-RED
		5	9-DR-6 Driver Return	ORG-RED
		6	48V Driver Power	GRY-BLK
CN11	.156" 4-Pin Header (Green)	1	Switch Ground	-
		2	9-SW-3 Switch	-
		3	9-DR-3 Driver Return	-
		4	48V Driver Power	-
CN12	.156" 6-Pin Header (Green)	1	9-LP-3 Light Return	ORG-YEL
		2	LED V+	YEL
		3	Switch Ground	BLK-BRN
		4	9-SW-7 Switch Return	LGN-ORG
		5	9-DR-7 Driver Return	ORG
		6	48V Driver Power	GRY-BLK
CN13	.100" 3-Pin Header	1	9-LP-4 GI Return (1A Max)	RED-BLK
		2	GI Ground	-
		3	LED V+	YEL-RED
CN14	.100" 6-Pin Header Node Extension Bus	1	Ground	BLK
		2	DIN	VIO-BLK
		3	DOUT	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED
F1	Fuse	-	7A SB, 125V	n/a

4.5 NODE 10 UPPER PLAYFIELD 8-DRIVER 48V PINOUT
520-6935-00

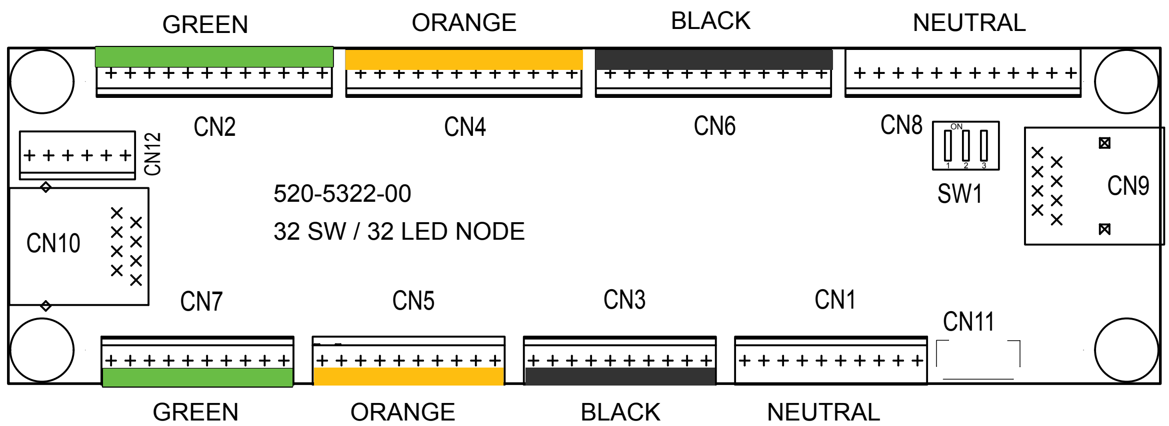


ID	Type	Pin	Description	Wire Color
SW1	Address DIP	-	Node 10- OFF-ON-OFF-OFF	-
CN2	RJ45	-	SPIKE Node Bus	Multi
CN3	RJ45	-	SPIKE Node Bus	Multi
CN4	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY
CN5	.156" 4-Pin Header (White)	1	Switch Ground	BLK-BLU
		2	10-SW-0 Switch Return	WHT-GRN
		3	10-DR-0 Driver Return	YEL-BLK
		4	48V Driver Power	GRY-BRN
CN6	.156" 6-Pin Header (White)	1	10-LP-0 Light Return	YEL-BLK
		2	LED V+	-
		3	Switch Ground	BLK-BLU
		4	10-SW-4 Switch Return	WHT-BRN
		5	10-DR-4 Driver Return	-
		6	48V Driver Power	-
CN7	.156" 4-Pin Header (Black)	1	Switch Ground	BLK-BLU
		2	10-SW-1 Switch	WHT-BLU
		3	10-DR-1 Driver Return	YEL-BRN
		4	48V Driver Power	GRY-BRN
CN8	.156" 6-Pin Header (Black)	1	10-LP-1 Light Return	YEL-BRN
		2	LED V+	-
		3	Switch Ground	BLK-BLU
		4	10-SW-5	WHT-RED
		5	10-DR-5 Driver Return	-
		6	48V Driver Power	-
CN9	.156" 4-Pin Header (Orange)	1	Switch Ground	BLK-BLU
		2	10-SW-2 Switch	WHT-VIO
		3	10-DR-2 Driver Return	YEL-RED
		4	48V Driver Power	GRY-BRN

ID	Type	Pin	Description	Wire Color
CN10	.156" 6-Pin Header (Orange)	1	10-LP-2 Light Return	YEL-RED
		2	LED V+	-
		3	Switch Ground	BLK-BLU
		4	10-SW-6 Switch Return	WHT-ORG
		5	10-DR-6 Driver Return	-
		6	48V Driver Power	-
CN11	.156" 4-Pin Header (Green)	1	Switch Ground	BLK-BLU
		2	10-SW-3 Switch	WHT-GRY
		3	10-DR-3 Driver Return	BLU-YEL
		4	48V Driver Power	GRY-BRN
CN12	.156" 6-Pin Header (Green)	1	10-LP-3 Light Return	YEL-ORG
		2	LED V+	YEL
		3	Switch Ground	BLK-BLU
		4	10-SW-7 Switch Return	WHT-YEL
		5	10-DR-7 Driver Return	-
		6	48V Driver Power	-
CN13	.100" 3-Pin Header	1	10-LP-4 GI Return (1A Max)	BLU-BLK
		2	GI Ground	-
		3	LED V+	YEL-BLU
CN14	.100" 6-Pin Header, Node Extension Bus	1	Ground	BLK
		2	DIN	VIO-BLK
		3	DOUT	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED
F1	Fuse	-	7A SB, 125V	n/a

4.6 NODE 11 UPPER PLAYFIELD 32-LIGHT AND SWITCH PINOUT

520-5322-00



ID	Type	Pin	Description	Wire Color
SW1	Address DIP		Node 11- OFF-ON-ON	-
CN1	.100" 10-Pin Header (White)	1	+5V	-
		2	11-SW-24 Switch Return	TAN-BLK
		3	11-SW-25 Switch Return	TAN-RED
		4	11-SW-26 Switch Return	TAN-ORG
		5	11-SW-27 Switch Return	TAN-YEL
		6	11-SW-28 Switch Return	TAN-GRN
		7	11-SW-29 Switch Return	TAN-BLU
		8	11-SW-30 Switch Return	-
		9	11-SW-31 Switch Return	-
		10	Switch Ground	BLK-ORG
CN2	.100" 12-Pin Header (Green)	1	+8V	-
		2	+5V	RED
		3	+5V	RED
		4	11-LP-0 Light Return	RED-BRN
		5	11-LP-1 Light Return	GRN-BRN
		6	11-LP-2 Light Return	BLU-BRN
		7	11-LP-3 Light Return	RED-ORG
		8	11-LP-4 Light Return	GRN-ORG
		9	11-LP-5 Light Return	BLU-ORG
		10	11-LP-6 Light Return	YEL-BLU
		11	11-LP-7 Light Return	YEL-VIO
		12	Ground	-
CN3	.100" 10-Pin Header (Black)	1	+5V	-
		2	11-SW-16 Switch Return	-
		3	11-SW-17 Switch Return	PNK-BRN
		4	11-SW-18 Switch Return	-
		5	11-SW-19 Switch Return	-
		6	11-SW-20 Switch Return	-
		7	11-SW-21 Switch Return	PNK-GRN
		8	11-SW-22 Switch Return	-
		9	11-SW-23 Switch Return	PNK-VIO
		10	Switch Ground	BLK-RED

ID	Type	Pin	Description	Wire Color
CN4	.100" 12-Pin Header (Orange)	1	+8V	-
		2	+5V	RED
		3	+5V	RED
		4	11-LP-8 Light Return	RED-YEL
		5	11-LP-9 Light Return	GRN-YEL
		6	11-LP-10 Light Return	BLU-YEL
		7	11-LP-11 Light Return	RED-GRN
		8	11-LP-12 Light Return	GRN
		9	11-LP-13 Light Return	BLU-GRN
		10	11-LP-14 Light Return	ORG-BLK
		11	11-LP-15 Light Return	ORG-BRN
		12	Ground	-
CN5	.100" 10-Pin Header (Orange)	1	+5V	RED
		2	11-SW-8 Switch Return	LGN-BLK
		3	11-SW-9 Switch Return	LGN-BRN
		4	11-SW-10 Switch Return	LGN-RED
		5	11-SW-11 Switch Return	-
		6	11-SW-12 Switch Return	-
		7	11-SW-13 Switch Return	-
		8	11-SW-14 Switch Return	-
		9	11-SW-15 Switch Return	-
		10	Switch Ground	BLK-GRY
CN6	.100" 12-Pin Header (Black)	1	+8V	-
		2	+5V	RED
		3	+5V	RED
		4	11-LP-16 Light Return	RED-GRY
		5	11-LP-17 Light Return	GRN-GRY
		6	11-LP-18 Light Return	BLU-GRY
		7	11-LP-19 Light Return	ORG-RED
		8	11-LP-20 Light Return	ORG-YEL
		9	11-LP-21 Light Return	ORG-GRN
		10	11-LP-22 Light Return	ORG-BLU
		11	11-LP-23 Light Return	ORG-VIO
		12	Ground	-

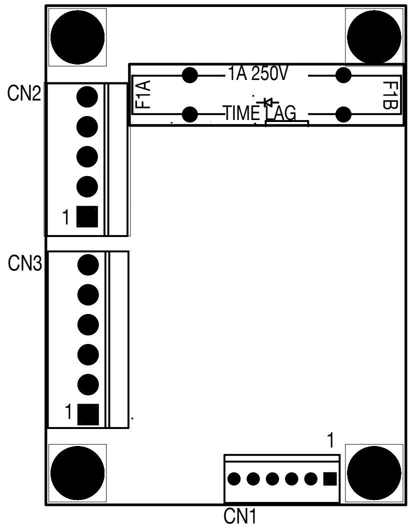
NODE 11 UPPER PLAYFIELD 32-LIGHT AND SWITCH PINOUT

ID	Type	Pin	Description	Wire Color
CN7	.100" 10-Pin Header (Green)	1	+5V	-
		2	11-SW-0 Switch Return	WHT-BRN
		3	11-SW-1 Switch Return	WHT-RED
		4	11-SW-2 Switch Return	WHT-ORG
		5	11-SW-3 Switch Return	WHT-YEL
		6	11-SW-4 Switch Return	WHT-GRN
		7	11-SW-5 Switch Return	WHT-BLU
		8	11-SW-6 Switch Return	WHT-VIO
		9	11-SW-7 Switch Return	WHT-GRY
		10	Switch Ground	BLK-VIO
CN8	.100" 12-Pin Header (White)	1	+8V	-
		2	+5V	RED
		3	+5V	RED
		4	11-LP-24 Light Return	BRN-BLK
		5	11-LP-25 Light Return	BRN-RED
		6	11-LP-26 Light Return	BRN-ORG
		7	11-LP-27 Light Return	BRN-YEL
		8	11-LP-28 Light Return	BRN-GRN
		9	11-LP-29 Light Return	BRN-BLU
		10	11-LP-30 Light Return	BRN-VIO
		11	11-LP-31 Light Return	YEL-BLK
		12	Ground	-

ID	Type	Pin	Description	Wire Color
CN9	RJ45	-	SPIKE Node Bus	Multi
CN10	RJ45	-	SPIKE Node Bus	Multi
CN11	-	-	Not Used	-
CN12	.100" 6-Pin Header, Node Extension Bus	1	Ground	-
		2	DIN	-
		3	DOUT	-
		4	SCK	-
		5	RCK	-
		6	V+	-

4.7 DUAL MOTOR DRIVER

520-5338-00

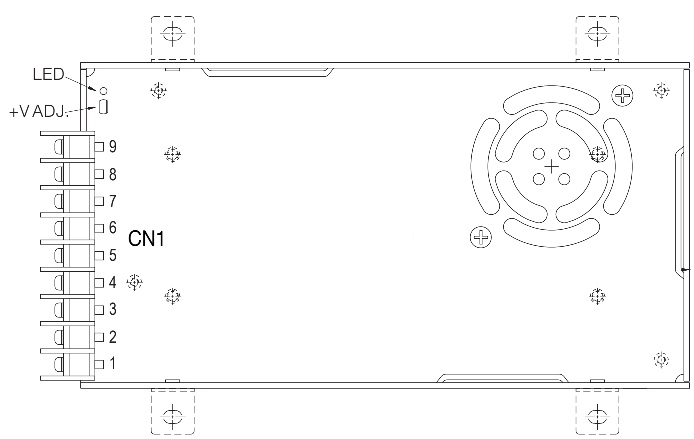


ID	Type	Pin	Description	Wire Color
CN1	.100" 6-Pin Connector	1	Ground	BLK
		2	PHB1	BLU-YEL
		3	PHB0	BLU-ORG
		4	PHA1	BLU-RED
		5	PHA0	BLU-BRN
		6	V+	RED
CN2	.156 5-Pin Connector	1	GND	BLK
		2	KEY	Key
		3	N/C	-
		4	N/C	-
		5	+48 VDC IN	GRY
CN3	.156 6-Pin connector	1	DRIVEB-1	BRN
		2	Ground	-
		3	DRIVEB-0	GRY
		4	DRIVEA-1	-
		5	Ground	-
		6	DRIVEA-0	-

4.8 MAIN POWER SUPPLY

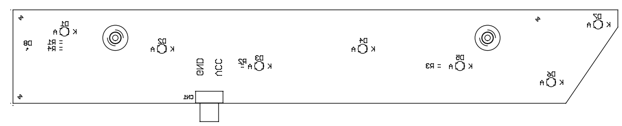
011-5001-00

ID	Type	Pin	Description	Wire Color
CN1	Screw Terminal	1	AC Line Hot In	BLK
		2	AC Line Neutral In	WHT
		3	Earth Ground In	GRN
		4	DC Ground	BLK
		5	DC Ground	BLK
		6	DC Ground	BLK
		7	+48 V System Power	GRY
		8	+48 V System Power	GRY
		9	+48 V System Power	GRY



4.9 TROUGH OPTO TRANSMITTER

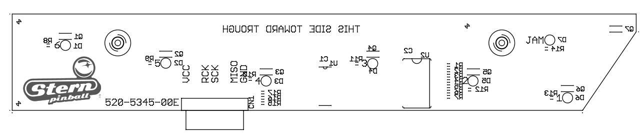
520-5344-00



ID	Type	Pin	Description	Wire Color
CN1	.100" 3-Pin Header	1	Ground	BLK
		2	N/C	-
		3	+5 VDC IN	RED

4.10 TROUGH OPTO RECEIVER

520-5345-01



ID	Type	Pin	Description	Wire Color
CN1	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	-
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	N/C	-
		7	+5 VDC IN	RED

4.11 STAR LOWER PLAYFIELD GRID LED

520-6969-00

ID	Type	Pin	Description	Wire Color
CN1	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY
CN2	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	N/C	-
		7	+5 VDC IN	RED
CN3	.100" 4-Pin Header	1	Ground	-
		2	LED62	ORG-RED
		3	LED63	ORG-YEL
		4	+5 VDC LED Supply	RED

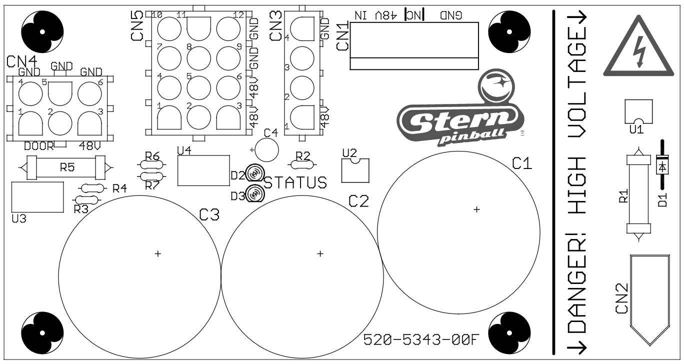
4.12 STAR UPPER PLAYFIELD LED

520-6970-00

ID	Type	Pin	Description	Wire Color
CN1	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY
CN2	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	N/C	-
		7	+5 VDC IN	RED
CN4	.100" 5-Pin Header	1	LED35	YEL-RED
		2	LED36	YEL-BRN
		3	LED37	ORG-GRN
		4	LED38	YEL-ORG
		5	+5 VDC LED Supply	RED
CN6	.100" 7-Pin Header	1	LED52	RED-WHT
		2	LED53	GRN-WHT
		3	LED54	BLU-WHT
		4	LED55	ORG-GRY
		5	LED56	ORG-WHT
		6	LED57	ORG-BLU
		7	N/C	-
		8	+5 VDC LED Supply	RED
CN7	.100" 10-Pin Header	1	LED43	RED-GRY
		2	LED44	GRN-GRY
		3	LED45	BLU-GRY
		4	LED46	RED-VIO
		5	LED47	GRN-VIO
		6	LED48	BLU-VIO
		7	LED49	RED-BLU
		8	LED50	GRN-BLU
		9	LED51	BLU
		10	+5 VDC LED Supply	RED
CN8	.100" 7-Pin Header	1	LED58	BRN-BLK
		2	LED59	BRN-RED
		3	LED60	BRN-ORG
		4	LED61	BRN-YEL
		5	LED62	BRN-GRN
		6	LED63	YEL-BLU
		7	N/C	-
		8	+5 VDC LED Supply	RED
CN9	.100" 6-Pin Header	1	+5 VDC LED Supply	RED
		2	LED39	BLU-BRN
		3	LED40	BLU-RED
		4	LED41	BLU-ORG
		5	LED42	BLU-YEL
		6	Ground	BLK

4.13 POWER DISTRIBUTION BOARD

520-5343-00



ID	Type	Pin	Description	Wire Color
CN1	.156" 7-Pin Header	1	+48 VDC IN	GRY
		2	+48 VDC IN	GRY
		3	+48 VDC IN	GRY
		4	Key	Key
		5	Ground	BLK
		6	Ground	BLK
		7	Ground	BLK
CN2	.093" 3-Pin Header	1	Line In (100-240 VAC)	BLK
		2	Neutral	WHT
		3	Earth Ground	GRN
CN3	.084" 4-Pin Header	1	+48 VDC to CPU Node	GRY
		2	Door Interlock Switch Status	GRY-RED
		3	Line Voltage Status	VIO
		4	Ground	BLK
CN4	.084" 6-Pin Header	1	Door Interlock Switch +48V	GRY
		2	Door Interlock Switch +48V	GRY
		3	Switched 48V Out (to Node 1)	GRY-YEL
		4	Door Interlock Return Ground	GRY-RED
		5	Door Interlock Return Ground	GRY-RED
		6	Ground (to Node 1)	BLK
CN5	.084" 12-Pin Header	1	Switched 48V Node Power	GRY
		2	Switched 48V Node Power	GRY
		3	Switched 48V Node Power	GRY
		4	Switched 48V Node Power	GRY
		5	Switched 48V Node Power	GRY
		6	Switched 48V Node Power	GRY
		7	Node Ground	BLK
		8	Node Ground	BLK
		9	Node Ground	BLK
		10	Node Ground	BLK
		11	Node Ground	BLK
		12	Node Ground	BLK

Figure 4.13.1. Power Distribution Board 520-5343-00 pinout

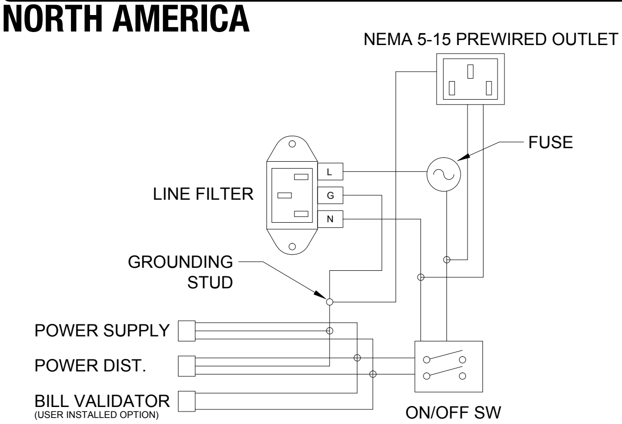
4.14 POWER PLUG WIRING

CAUTION

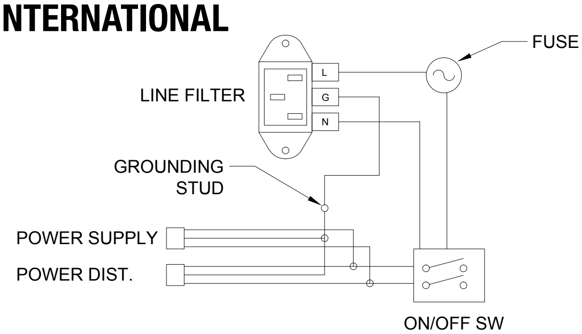
TO MAINTAIN SAFETY, GROUND WIRE FROM LINE FILTER IS TO BE MOUNTED FIRST ON GROUNDING STUD AND SECURED WITH NUT. ALL OTHER GROUNDS MAY THEN BE ATTACHED TO GROUNDING STUD.

REPLACE ALL FUSES WITH CORRECT CURRENT RATINGS!

NORTH AMERICA



INTERNATIONAL



LINE CORDS

Part Number	Description
034-6012-00	Line Cord, 3m, 5-15P USA
034-6012-01	Line Cord, 3m, CEE77P EUROPE
034-6012-02	Line Cord, 3m, BS1363P United Kingdom
034-6012-03	Line Cord, 3m, AS-NZS4417P Australia
034-6012-04	Line Cord, 3m, CEI23-16P Italy
034-6012-05	Line Cord, 3m, SEV1011P Switzerland
034-6012-06	Line Cord, 3m, JIS8303P Japan
034-6012-07	Line Cord, 3m, SI32P Israel
034-6012-08	Line Cord, 3m, BS546P S Africa, India
034-6012-09	Line Cord, 3m, IS6538P S. India

LINE FUSES

Line Voltage (Region)	Fuse Current	Type	Part Number
120V (North America)	8 A	Slow Blow MDL	200-5000-05
220/240v (Europe, Australia, UK)	5 A	Slow Blow MDL	200-5000-01

Figure 4.14.1. Standard fuses for line connections, 120V and 240V

5. PARTS REFERENCE

5.1 PLAYFIELD RUBBER PARTS

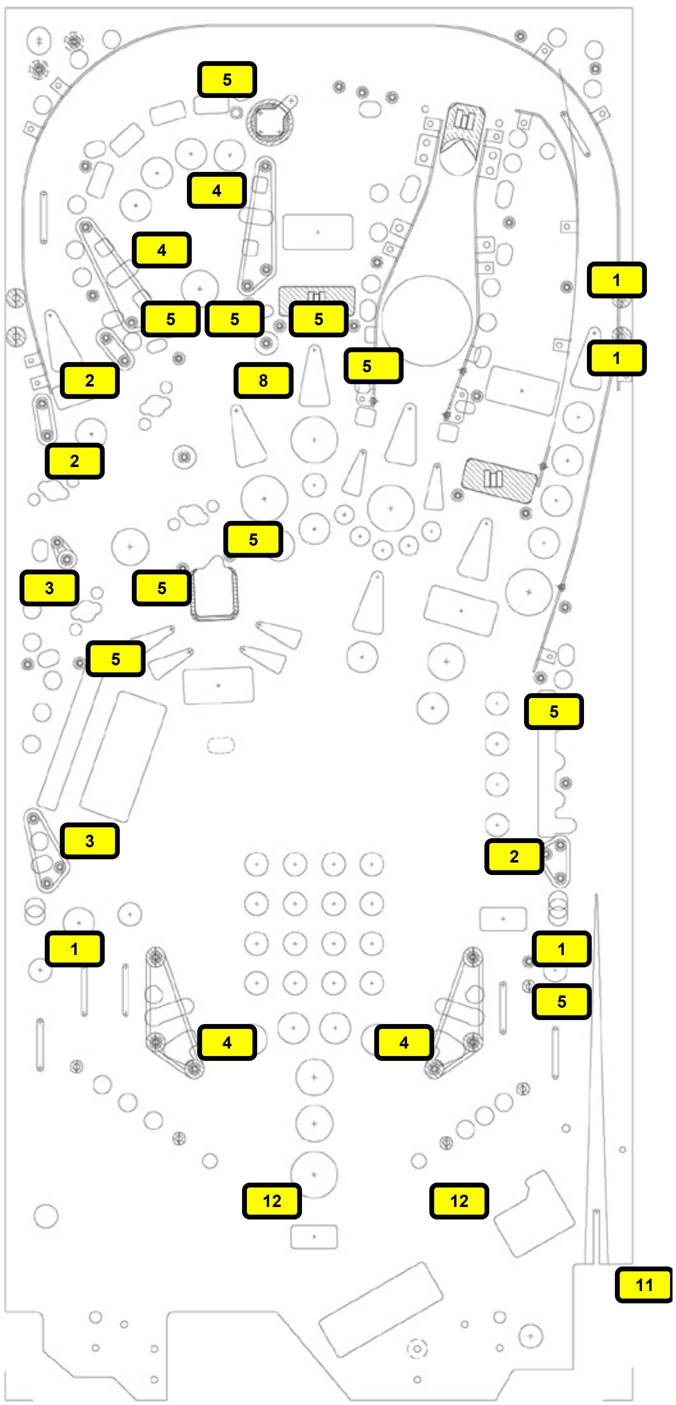


Figure 5.1.3. Rubber o-ring part locations

RUBBER O-RINGS

ID	Qty	Size (ID)	Size (OD)	Durometer	Color	Part Number
1	4	3/16"		50	Black	545-5348-01
8	2	3/8"		50	Black	545-5348-03
6	3	7/16"		50	Black	545-5348-18
2	3	3/4"		50	Black	545-5348-04
3	1	1"		50	Black	545-5348-05
7	1	1-3/4"		50	Black	545-5348-21
4	4	2"		50	Black	545-5348-08
5	9		7/16"	50	Black	545-5348-17

Figure 5.1.1. Rubber o-ring part numbers and usage. ID: Inner Diamter, OD: Outer Diameter, Durometer: Higher number is firmer, less bounce, and more durable.

ID	Qty	Description	Color	Part Number
11	3	Plunger Tip	Black	545-5276-00
12	2	Flipper Rubber	Black	545-5277-00
13	6	Bumper Pad (Sub assemblies)	Black	545-5105-00
15	2	Bumper Pad (Flippers)	Black	545-5428-00

Figure 5.1.4. Other rubber part numbers and usage

5.2 RUBBER SIZE CHART

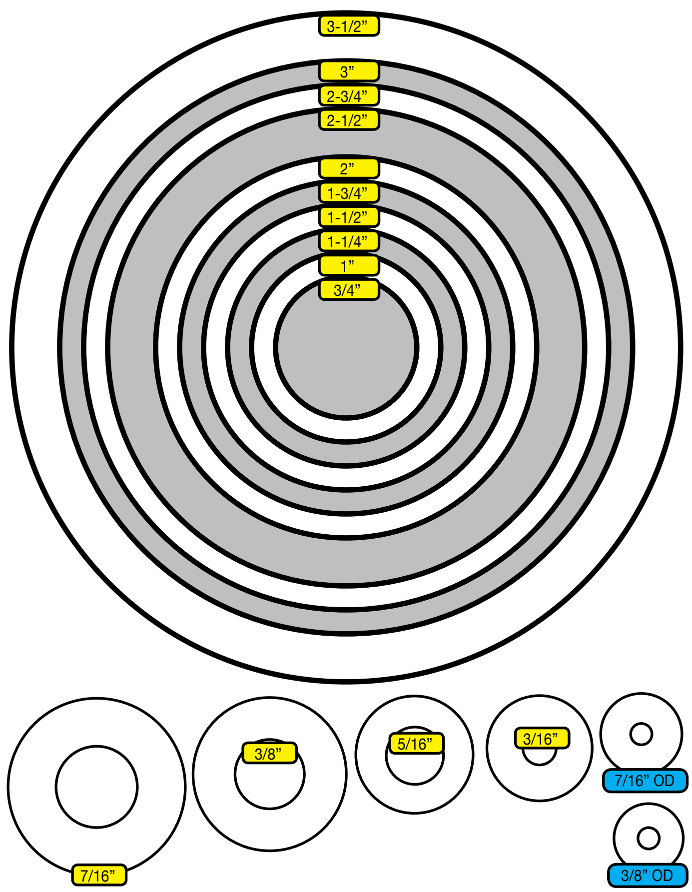


Figure 5.1.2. Rubber ring inner diameter sizing tool. Hold ring up to chart and read largest size on inside of ring. Dimensions are Inner Diameter (ID) unless otherwise noted as Outer Diamter (OD).

5.3 PLAYFIELD ASSEMBLIES, TOP

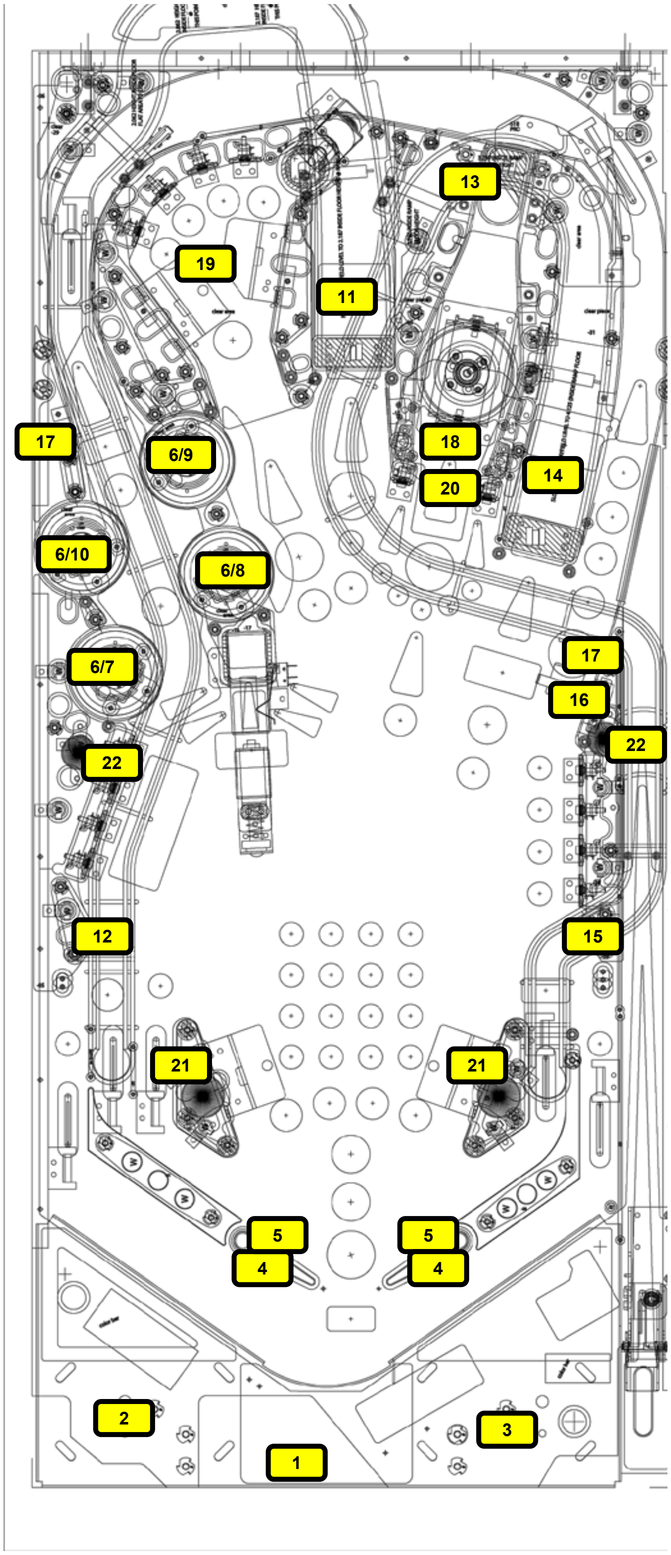
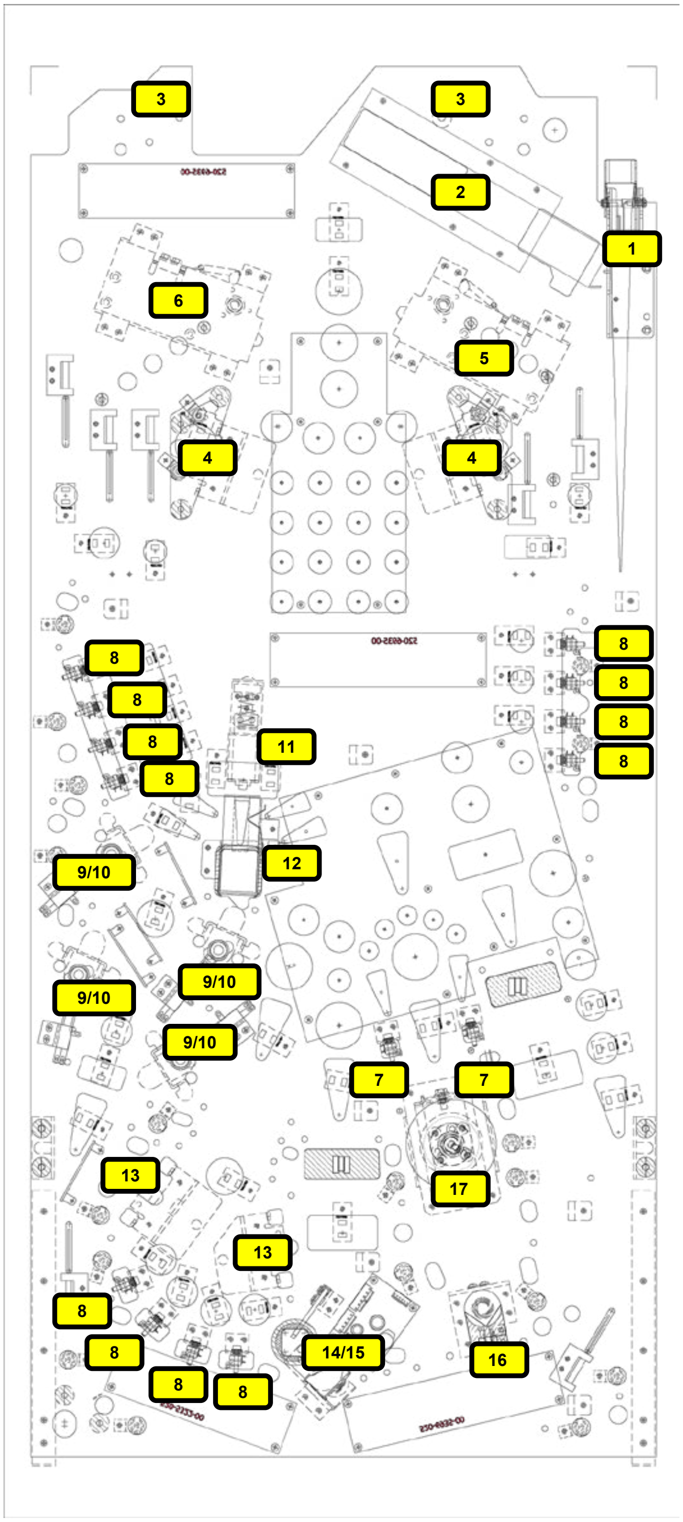


Figure 5.3.1. Major playfield assemblies, Top locations.

ID	Part Number	Description	Qty
1	500-6005-H1	Bottom Arch Assembly	1
2	755-51H1-12-Y	Instruction Card	1
3	755-5400-12-Y	Coin Card (USA)	1
4	515-5133-06-06	Flip Bat -Yellow	2
5	545-5277-10	Flipper Rubber -Black	2
6	516-0033-BRD	Pop Top Prime Assembly	4
7	550-7400-H1-SM	Hot-Stamped Bumper Cap -Space Man	1
8	550-7400-H1-DM	Hot-Stamped Bumper Cap -Demon	1
9	550-7400-H1-SC	Hot-Stamped Bumper Cap -StarChild	1
10	550-7400-H1-CM	Hot-Stamped Bumper Cap -Cataman	1
11	500-9954-00	Left Plastic Ramp Assembly	1
12	535-1164-00	Left Wire Ramp	1
13	535-1182-00	Vuk Snubber	1
14	500-9952-00	Right Ramp Assembly	1
15	535-1165-00	Right Wire Ramp	1
16	511-7655-00-GE	Spinner Assembly Left Hand	1
17	511-5240-01-SPI	Spotlight Flash LED	2
18	511-7677-00	Gene Head and Plate Assembly	1
19	511-7676-00	Paul Assembly	1
20	510-7534-01	Riveted Assembly Head Trough	1
21	550-5031-02	Mini Mars (Red)	2
22	550-5032-07	Hat (Orange)	2

5.4 PLAYFIELD ASSEMBLIES, BOTTOM



ID	Part Number	Description	Qty
1	500-9818-00	Auto-Plunger	1
2	500-9820-4BALL	4-Ball Trough Assembly	1
3	500-7172-00	Playfiled Supports	1
4	500-9920-01	SlingShot Assembly	2
5	500-6543-82-ND	Flip Asssembly RT with Coil 090-5083-03-ND	1
6	500-6543-83-ND	Flip Asssembly LT with Coil 090-5083-03-ND	1
7	500-9907-00-00	1/2" S/U Target Anti-Sway/ND	2
8	500-9904-00-00	1" SQ Target S/U AntiLoft/Light/ND	12
9	515-6459-04-ND	Pop Bumper Bottom Assy 26-1200	4
10	500-9934-01	Pop Bumper SW Assembly -LT	4
11	500-6697-00-ND	Kicker-Lugs Up Assembly	1
12	500-9812-ND	Power Scoop Assy with no diode	1
13	500-9920-01-RT	Slingshot Assembly 26-1200 Right	2
14	500-6511-01-ND	30Degree Eject assy 26-1200	1
15	500-6520-ND	30Degree Eject Switch	1
16	500-9965-00	Up-Post VUK	1
17	500-7144-03	Spinning Disk Assembly	1

Figure 5.4.1. Major playfield assemblies, Bottom locations.

5.5 BACKBOX PARTS

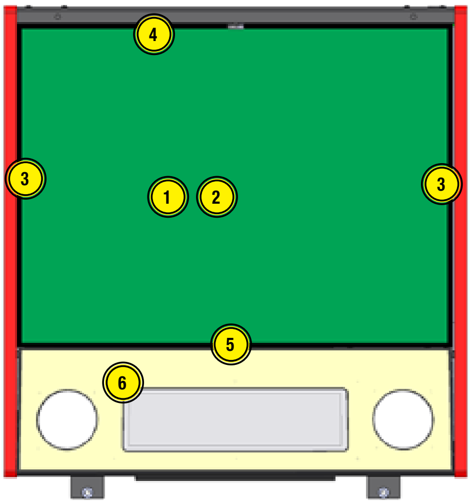


Figure 5.5.1. Backbox external assemblies and components

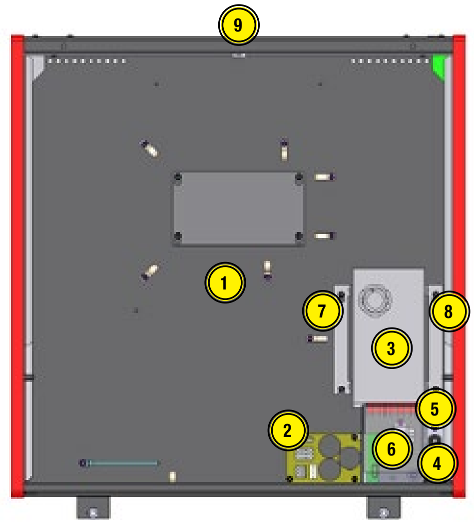


Figure 5.5.2. Backbox internal assemblies and components

EXTERNAL

ID	Part Number	Description	Qty
1	830-52H1-00	Translite Art	1
1	830-52H1-GER	Translite Art (Germany)	1
2	660-5038-02	Back Glass	1
3	545-5018-14	Plastic Extrusion 18-1/8"	2
4	545-5018-15	Glass Channel 26"	1
5	545-6313-01	Glass lift Channel 26"	1
6	500-9854-H1	Speaker Panel Assembly	1
	820-66H1-01	Side Panel Decal 1	1
	820-66H1-01G	Side Panel Decal 1 (Germany)	
	820-66H1-02	Side Panel Decal 2	1
	820-66H1-02G	Side Panel Decal 2 (Germany)	

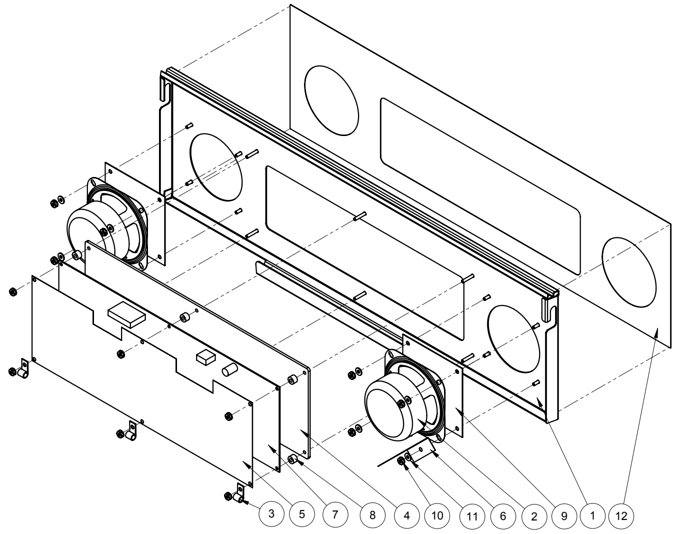
INTERNAL

ID	Part Number	Description	Qty
1	515-6957-10	CPU Node Board -10 w/ LCD Adapter	1
2	520-5343-00	Power Distribution Board	1
3	011-5001-00	Power Supply 48V/320W	1
4	515-9769-00	Utility Outlet (USA)	1
5	205-5001-00	Fuse Holder-Screw in	1
6	535-0772-00	Cover AC	1
7	535-0879-01	Power supply bracket	1
8	535-0879-00	Power supply bracket	1
9	355-5168-00	Backbox Lock, 5/8 in	1
10	180-5001-03	Power Switch	1
	034-6012-00	Line Cord-3M 5-15P/C13RA*	1

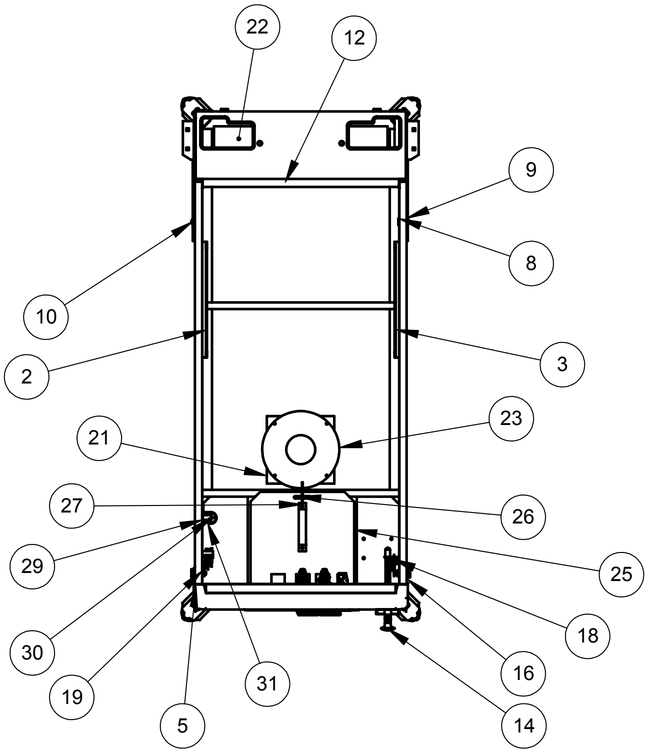
5.6 SPEAKER PANEL PARTS

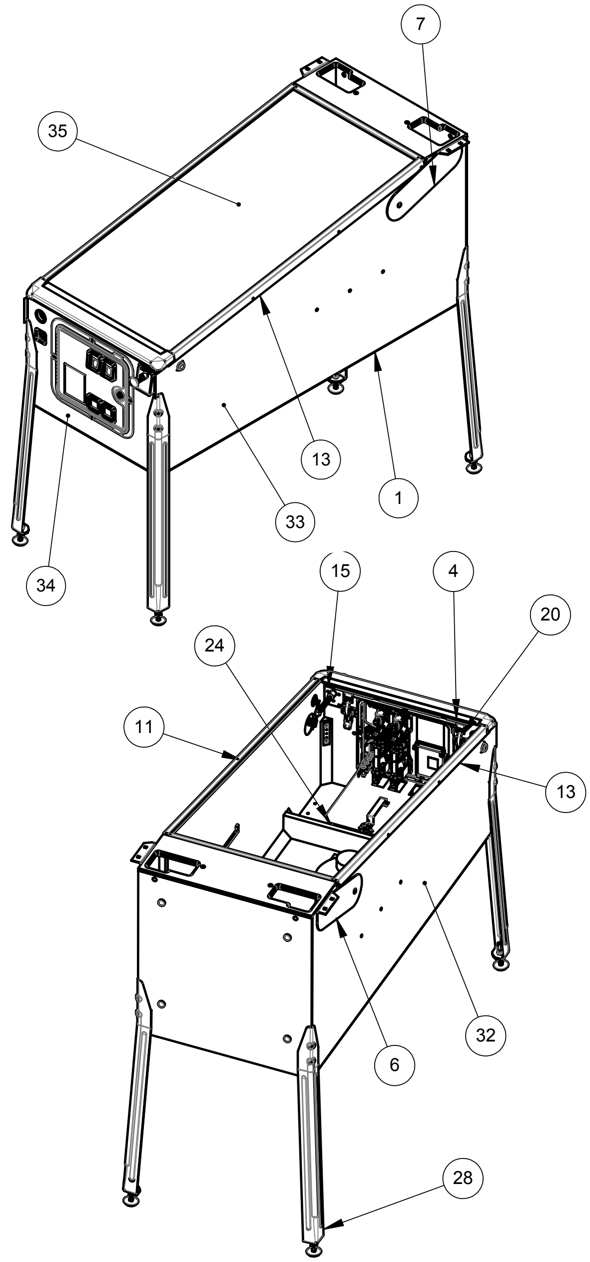
500-9854-H1

ID	PART NUMBER	DESCRIPTION	QTY.
1	515-9763-00	SPEAKER PANEL KISS PRO	1
2	031-5004-02	SPEAKER	2
3	040-5000-03	1/4" CABLE CLAMP	3
4	545-7849-00	DISPLAY LENS	1
5	545-7856-00	FISCHE PAPER: LED DISPLAY	1
6	545-7877-00	FISCHE PAPER	1
7	520-5052-15	LED DISPLAY	1
8	254-5000-09	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/4"	6
9	535-8081-01	SPEAKER GRILL	2
10	240-5008-00	6-32 KEPS NUT	14
11	242-5001-00	#6 WASHER	8
12	820-8369-H1	DECAL: SPEAKER PANEL, KISS PRO	1



5.7 CABINET PARTS



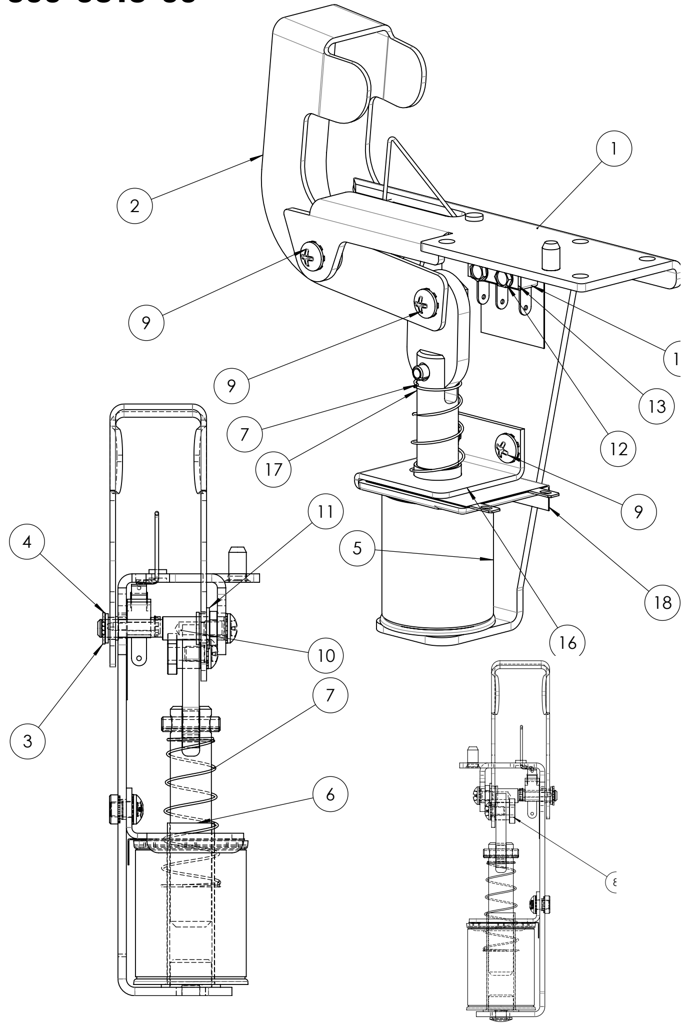


ID	Part Number	Description	Qty
1	525-5844-00	CABINET, KISS (PLUNGER & TWO BUTTONS)	1
2	535-5989-00	SLIDE & PIVOT BRACKET - LEFT SIDE	1
3	535-5990-00	SLIDE & PIVOT BRACKET - RIGHT SIDE	1
4	535-0399-00	CABINET BRACKET, PF SUPPORT	1
5	500-6882-03-00	FRONT MOLDING ASSEMBLY - NO HOLE - Black	1
6	535-7999-00	PIVOT HINGE, LEFT - Black	1
7	535-7999-01	PIVOT HINGE, RIGHT - Black	1
8	254-5042-00	SPACER NUT, HEX, 1/2"OD, 1/4-20	2
9	242-5084-00	WASHER, 1/2" I.D., 3/16" THK	2
10	231-5014-00	1/4-20 X 7/8" CARRIAGE BOLT	2
11	545-5017-00	PLASTIC CHANNEL	2
12	545-9802-00	GLASS REAR EXTRUSION	1
13	535-7297-02	SIDE ARMOR- BLACK WRINKLE	2
14	500-6146-00-07	BALL SHOOTER ASSEMBLY	1
15	535-5027-01	PLUNGER SUPPORT PLATE, NOTCHED	1
16	500-5026-32	FLIPPER BUTTON ASSY (Red)	2
17	501-5018-173	COIN DOOR 2-CHUTE NO EMBOSS	1
18	180-5160-01	FLIPPER SWITCH, Single	2
20	355-5038-00	DRAW LATCH, OVER CENTER CLAMP	2
21	545-5072-03	GRILL - SPEAKER / VENT	1
22	545-5072-02	GRILL - SPEAKER / VENT	1
23	031-5007-01	SPEAKER, CABINET 8" ROUND, 4 OHM	1
24	545-5090-00	CASH BOX - PLASTIC	1
25	535-5013-03	CASH BOX COVER	1

ID	Part Number	Description	Qty
26	535-7562-00	CASH BOX LOCK BRACKET	1
27	535-7772-00	HAIR PIN CLIP	1
28	500-5921-XX	LEG ASSEMBLY - BLACK	4
29	516-0007-00	TILT ASSEMBLYv	1
32	820-66H1-03	DECAL, CABINET LEFT, KISS	1
	820-66H1-03G	DECAL, CABINET LEFT, KISS (GERMANY)	
33	820-66H1-04	DECAL, CABINET RIGHT, KISS	1
	820-66H1-04G	DECAL, CABINET RIGHT, KISS (GERMANY)	
34	820-66H1-05	DECAL, CABINET FRONT, KISS	1
	820-66H1-05G	DECAL, CABINET FRONT, KISS (GERMANY)	
35	660-5001-00	PLAYFIELD GLASS	1

5.8 AUTO LAUNCH ASSEMBLY

500-9818-00

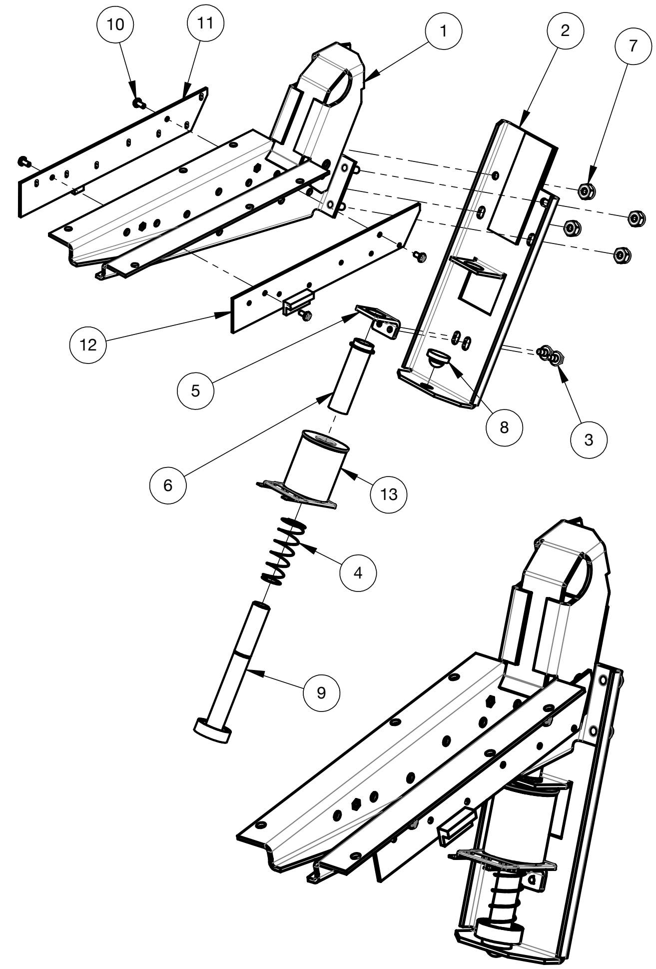


ID	Part Number	Description	Qty
1	515-9689-00	MAIN BRKT: AUTO-PLUNGER	1
2	535-0728-00	KICKER ARM, AUTO-PLUNGER	1
3	270-5001-00	RETAINING E-RING, 3/16" SHAFT OD	1
4	545-5352-00	NYLINER, 3/16" SHAFT	1
5	090-5001-ND	COIL - 23-800, NO DIODE	1
6	545-5411-00	COIL SLEEVE	1
7	266-5020-00	COMPRESSION SPRING-CONICAL	1
8	530-7834-00	PIN: KICKER ARM, AUTO-PLUNGER	1
9	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	4
10	530-7835-00	PIVOT, AUTO-PLUNGER	1
11	545-5423-00	NYLINER, 1/4" SHAFT, 4L1-FF	1
12	237-5937-02	SCREW, 2-56 X 1/2" HWH MS	2
13	535-6539-00	SWITCH BODY PROTECT PLATE	1
14	180-5157-01	SHOOTER SWITCH - SHORT ARM	1
15	545-6268-00	FISCHE PAPER	1
16	535-0762-00	COIL BRACKET-AUTOPLUNGER	1
17	515-6304-03	PLUNGER / LINK ASSEMBLY	1
18	545-0762-00	FISCHE PAPER: AUTO-LAUNCHER	1

Figure 5.8.1. Auto Launch Assembly 500-9818-00 bill of materials.

5.9 BALL TROUGH ASSEMBLY

500-9820-00



ID	Part Number	Description	Qty
1	515-7811-00	MAIN BRKT. BALL TROUGH	1
2	515-7812-00	COIL BRACKET, BALL TROUGH	1
3	237-5975-04	SCREW, 8-32 X 1/4" HWH SWAGE SERR	2
4	266-5020-00	COMPRESSION SPRING-CONICAL	1
5	535-5203-03	COIL RETAINING BRACKET	1
6	545-5076-01	COIL SLEEVE	1
7	240-5102-00	8-32 NYLON LOCK NUT	4
8	545-5105-00	RUBBER BUMPER	1
9	515-7309-01	PLUNGER ASSEMBLY	1
10	237-5909-00	SCREW, 4-40 X 1/4" PPH SEMS	4
11	520-5344-00	TROUGH BOARD #1 - ILED TRANSMITTER	1
12	520-5345-00	TROUGH BOARD #2 - RECEIVER	1
13	090-5004-ND	COIL 27-1500 - NO DIODE	1
98*	605-5006-00	SHRINK TUBING 1/8"	.42 FT.
99*	036-5611-11-F5	CABLE TROUGH OPTOS	1

Figure 5.9.1. Ball trough assembly - 500-9820-00 bill of materials.

5.10 FLIPPER ASSEMBLY, LEFT

LOWER: 500-6543-83-ND
UPPER: 500-6543-15-ND

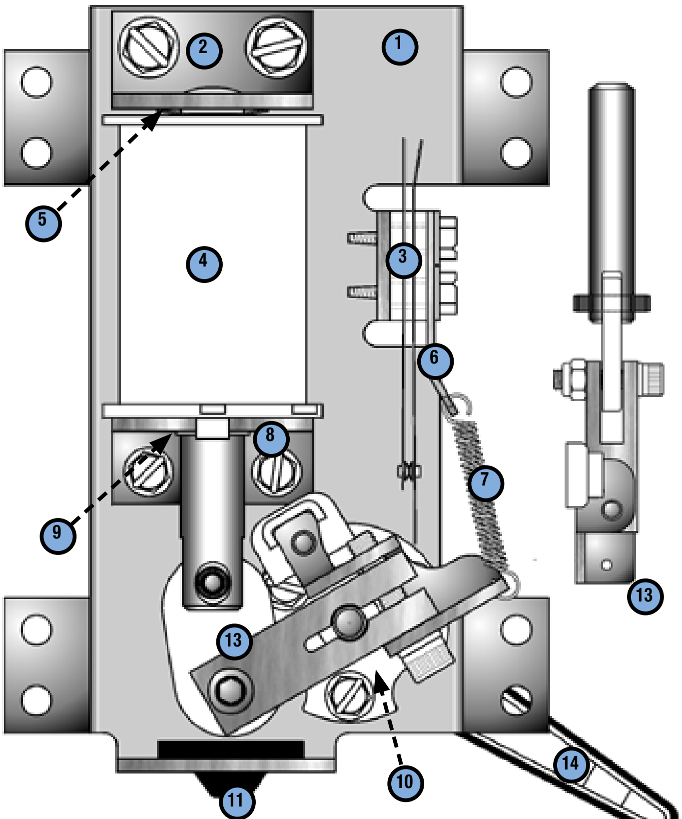


Figure 5.10.1. Left flipper assembly 500-6543-02-ND bottom view.

ID	Part Number	Description	Qty
1	515-6617-01	FLIPPER BASE PLATE LEFT KIT W/ BRACKET MOUNT HARDWARE	1
2	515-6308-01	COIL STOP BRACKET	1
3	180-5149-00	SWITCH - END OF STROKE N/C	1
4*	090-5083-03-ND	COIL-DUAL WINDING (500-6543-83-ND)	1
4	090-5062-ND	COIL-SINGLE WINDING (500-6543-15-ND)	1
5	269-5002-00	SPRING WASHER	1
6	535-7354-00	SWITCH RETURN SPRING BRACKET	1
7	265-5035-00	SPRING FLIPPER RETURN	1
8	535-7356-00	COIL SUPPORT BRACKET	1
9	545-5388-00	COIL SLEEVE, FLIPPER	1
10	545-5070-00	FLIPPER BAT BUSHING	1
11	545-5428-00	FLIPPER BUMPER PAD	1
12	237-6144-00	SET SCREW #10-32 x 3/4" SOCKET	1
13	515-7203-01	PLUNGER/CRANK ASSEMBLY, LEFT	1
14	515-5133-06	FLIPPER BAT AND SHAFT (500-6553-83-ND)*	1
14	515-6275-08-01	FLIPPER BAT AND SHAFT RED MINI (500-6543-15-ND Assy)*	1
	500-6307-10	FLIPPER REBUILD KIT, LEFT	
		* Refer to game rubber chart for flipper rubber color and part number.	

Figure 5.11.2. Left flipper assembly 500-6543-83-ND BOM

5.11 FLIPPER ASSEMBLY, RIGHT

500-6543-82-ND

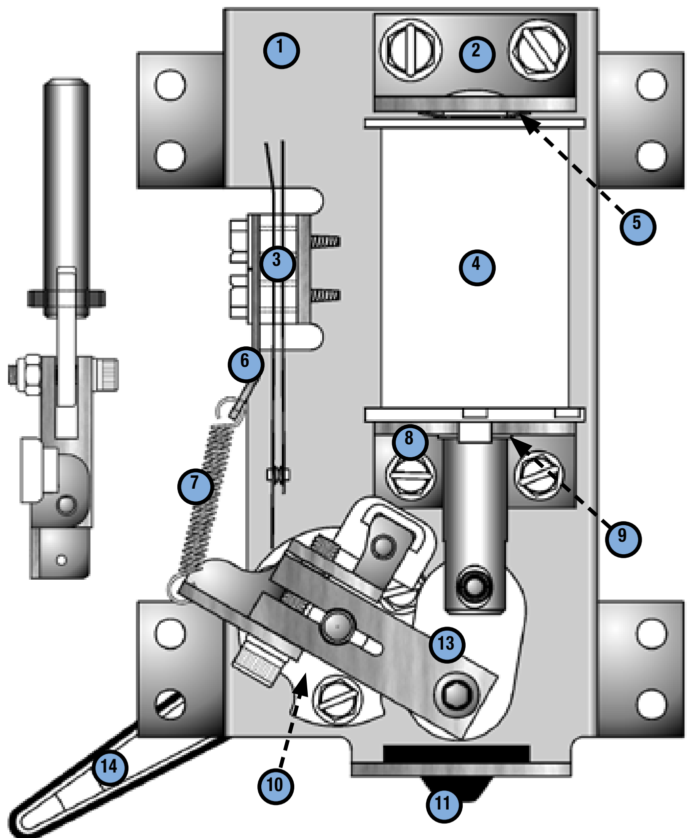


Figure 5.11.1. Right flipper assembly 500-6543-12-ND bottom view.

ID	Part Number	Description	Qty
1	515-6617-00	FLIPPER BASE PLATE RIGHT KIT W/ BRACKET MOUNTING HARDWARE	1
2	515-6308-01	COIL STOP BRACKET	1
3	180-5149-00	SWITCH - END OF STROKE N/C	1
4	090-5083-03-ND	COIL-DUAL WINDING	1
5	269-5002-00	SPRING WASHER	1
6	535-7354-00	SWITCH RETURN SPRING BRACKET	1
7	265-5035-00	SPRING FLIPPER RETURN	1
8	535-7356-00	COIL SUPPORT BRACKET	1
9	545-5388-00	COIL SLEEVE, FLIPPER	1
10	545-5070-00	FLIPPER BAT BUSHING	1
11	545-5428-00	FLIPPER BUMPER PAD	1
12	237-6144-00	SET SCREW #10-32 x 3/4" SOCKET	1
13	515-7203-00	PLUNGER/CRANK ASSEMBLY	1
14	515-5133-06	FLIPPER BAT AND SHAFT*	1
	500-6307-00	FLIPPER REBUILD KIT, RIGHT	
		* Refer to game rubber chart for flipper rubber color and part number.	

Figure 5.11.3. Right flipper assembly 500-6543-82-ND bill of materials.

5.12 SLING SHOT ASSEMBLIES

500-9920-01-D7

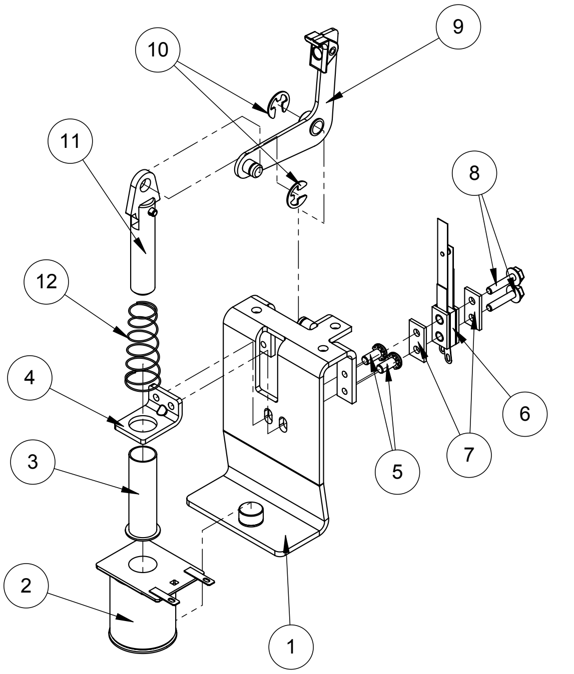


Figure 5.12.1. Sling shot core assembly explosion.

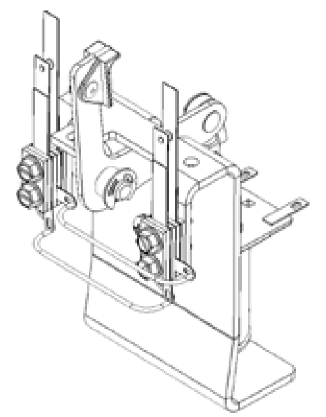


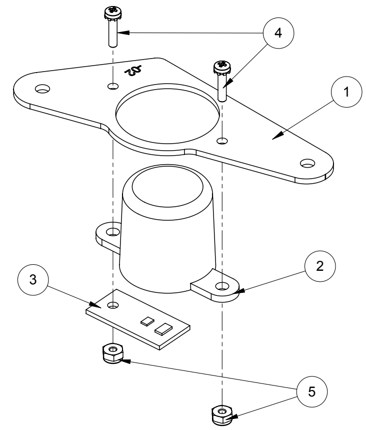
Figure 5.12.2. 500-9920-01-D7 sling shot assembly.

ID	Part Number	Description	Qty
1	515-5339-01-D7	SLING SHOT BRKT ASSY WHOA NELLIE	1
2	090-5044-ND	COIL - 26-1200, NO DIODE	1
3	545-5031-00	COIL SLEEVE	1
4	535-5203-03	COIL RETAINING BRACKET	1
5	232-5301-00	SCREW, 8-32 X 3/8" PPH SEMS	2
6	180-5231-00	SLING SHOT SWITCH - 2 LUG - STANDARD LUGS	1
7	535-5045-00	SWITCH PLATE	2
8	237-5976-04	SCREW, 6-32 X 5/8" HWH SWAGE	2
9	515-5340-01	ARM & TIP ASSY	1
10	270-5002-00	RETAINING RING - 1/4"	2
11	515-5338-00	PLUNGER & LINK ASSEMBLY	1
12	266-5020-00	COMPRESSION SPRING-CONICAL	1

Figure 5.12.3. Sling shot 500-9924-00, -01 bill of materials.

5.13 SLINGSHOT FLASH ASSY - 02

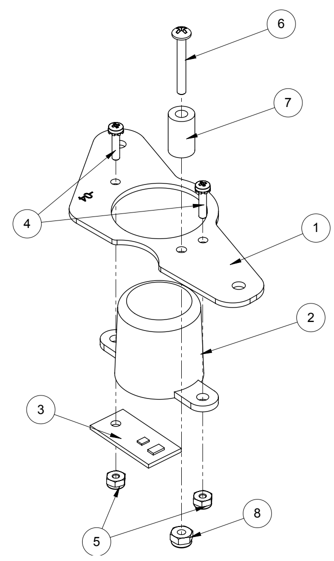
511-7641-02



ID	Part Number	Description	Qty
1	830-7028-02	BUTYRATE SET - 02	1
2	550-5031-02	MINI MARS W/ EARS - RED SB	1
3	520-6785-00	FLASH LAMP PCB	1
4	237-5813-00	SCREW, 4-40 X 1/2" PPH SEMS	2
5	240-5303-00	4-40 NYLON LOCK NUT	2

5.14 SLINGSHOT FLASH ASSY- 04

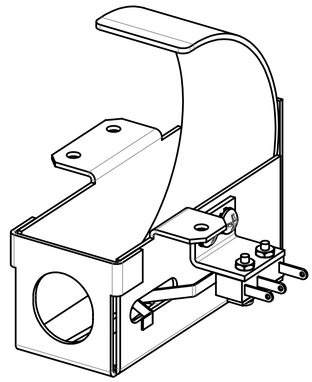
511-7641-04

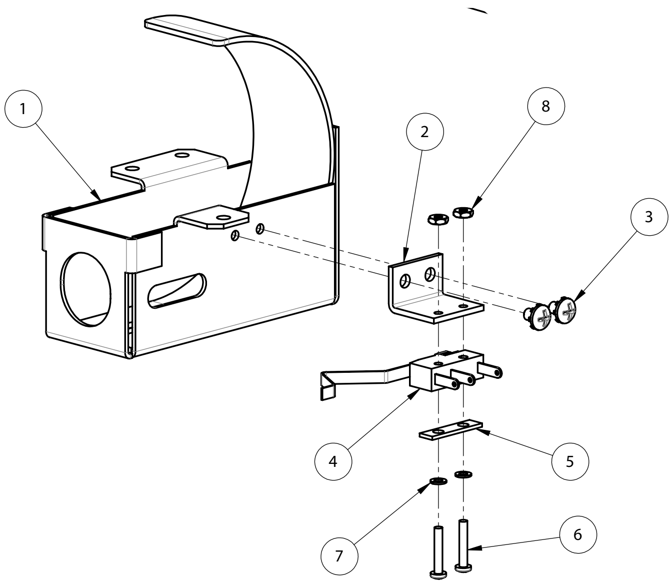


ID	Part Number	Description	Qty
1	830-7028-04	BUTYRATE SET - 04	1
2	550-5031-02	MINI MARS W/ EARS - RED SB	1
3	520-6785-00	FLASH LAMP PCB	1
4	237-5813-00	SCREW, 4-40 X 1/2" PPH SEMS	2
5	240-5303-00	4-40 NYLON LOCK NUT	2
6	237-5506-00	SCREW, 6-32 X 1" PPH MS	1
7	254-5000-14	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 5/8"	1
8	240-5005-00	6-32 NYLON STOP NUT	1

5.15 POWER SCOOP

500-9812-ND

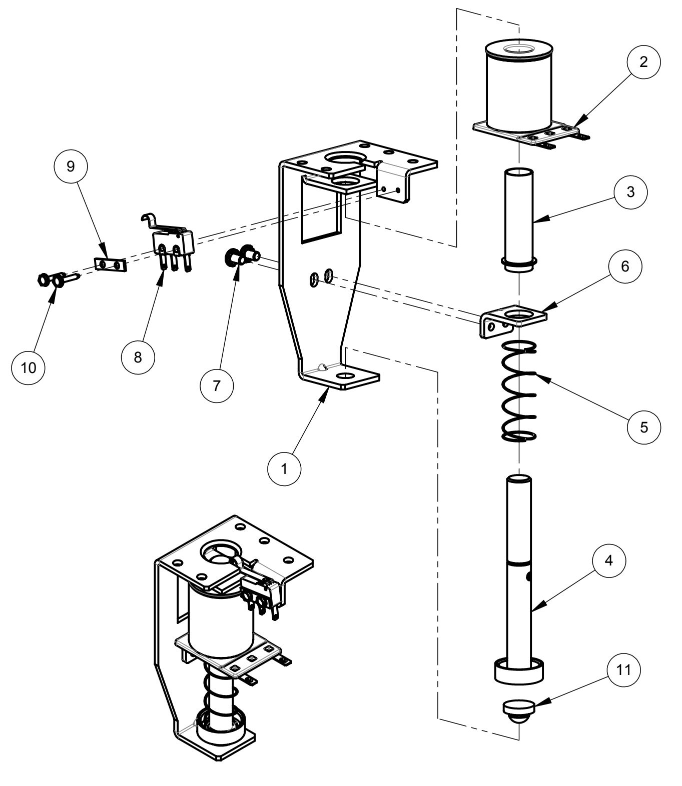




ID	Part Number	Description	Qty
1	515-9659-00	POWER SCOOP WELDMENT, PRO	1
2	535-6173-00	MICRO-SWITCH BRACKET	1
3	232-5209-00	SCREW, 6-32 X 3/16" PPH SEMS	2
4	180-5057-00	MICRO-SWITCH	1
5	535-6539-00	SWITCH BODY PROTECT PLATE	1
6	237-5806-00	SCREW, 2-56 X 1/2" PPH MS ZINC	2
7	244-5001-00	#2 LOCK WASHER, SPLIT	2
8	240-5301-00	2-56 HEX NUT	2
99*	036-5544-01	3" CABLE GENERIC SWITCH	1

5.16 UP-POST VUK ASSEMBLY

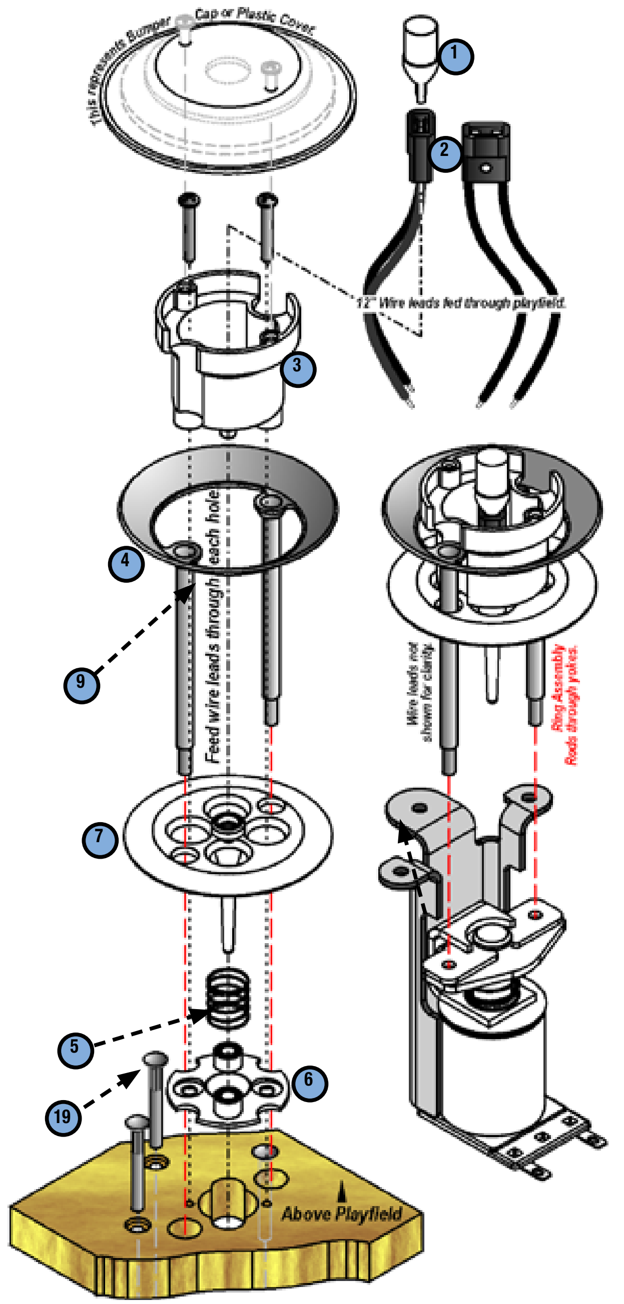
550-9965-00

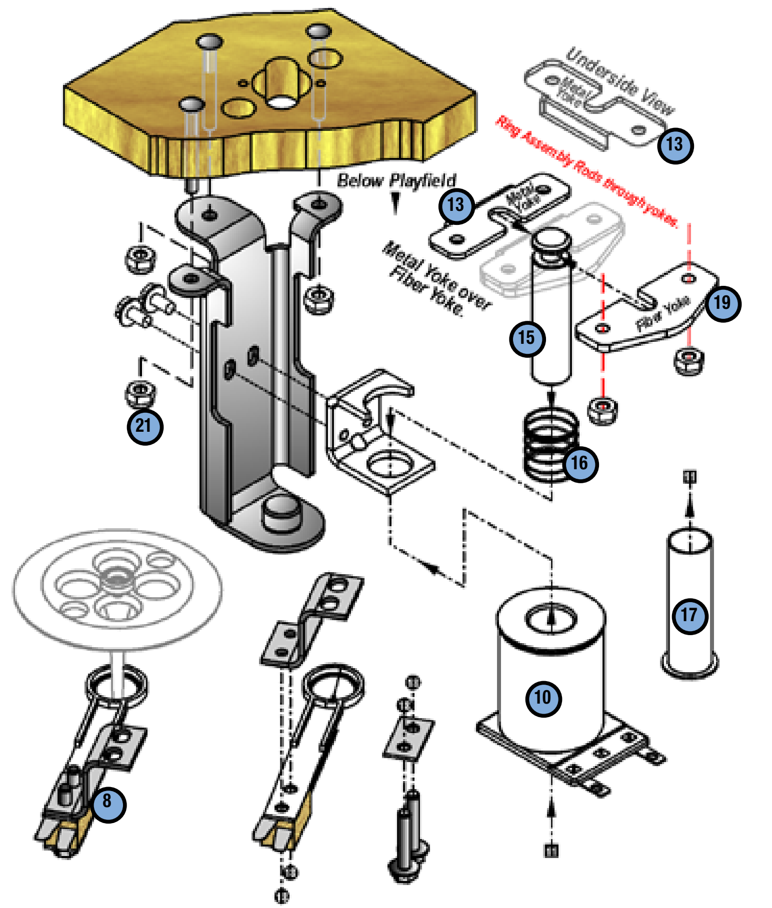


ID	Part Number	Description	Qty
1	535-1192-00	BRACKET, UP-POST VUK, STAR	1
2	090-5001-ND	COIL - 23-800, NO DIODE	1
3	545-5076-01	COIL SLEEVE	1
4	515-9835-00	PLUNGER ASSEMBLY, UP-POST VUK, STAR	1
5	266-5047-00	COMPRESSION SPRING, POP BUMPER COIL	1
6	535-5203-03	COIL RETAINING BRACKET	1
7	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	2
8	180-5209-00	SUB MINIATURE SWITCH - SIM. ROLLER	1
9	535-6539-00	SWITCH BODY PROTECT PLATE	1
10	237-5937-02	SCREW, 2-56 X 1/2" HWH MS	2
11	545-5105-00	RUBBER BUMPER	1
97*	605-5002-00	SHRINK TUBING 1/8" BLACK	.083 FT.
98*	605-5006-00	SHRINK TUBING 1/8"	.083 FT.
99*	036-6246-00	CABLE, GENERIC COIL W/ SWITCH	1

5.17 POP BUMPER ASSEMBLY

516-6784-XX





Part Number	Description	Qty
515-6459-01L	BUMPER/RING TOP ASSY, W/ LED 1	1
515-6459-04-ND	BUMPER BOTTOM ASSY, NO DIODE	1

Figure 5.17.2. 516-6784-XX Pop bumper assy major subassemblies.

ID	Part Number	Description	Qty
8	500-9934-01	POP BUMPER SWITCH ASSY-2 - LUG-LEFT	1
9	240-5005-00	6-32 NYLON STOP NUT	1
10	090-5044-ND	COIL - 26-1200	1
11	237-5976-01	#6-32 X 1/4" SHWH SWAGE ZN	2
12	240-5005-00	#6-32 NYLON STOP NUT	9
13	535-7347-00	METAL YOKE STOP	1
14	234-5101-00	* 8 X 1/2 SLT	6
15	530-5348-00	PLUNGER, POP BUMPER	1
16	266-5047-00	COMPRESSION SPRING, POP BUMPER	1
17	545-5031-00	COIL SLEEVE	1
18	515-5939-00	COIL BRACKET POP BUMPER ASSY	1
19	545-5609-00	FIBER YOKE	1
20	535-7346-00	METAL YOKE	1
21	237-5957-00	#6-32 x 1-3/16" SPIRAL FIN SHANK SCREW	3

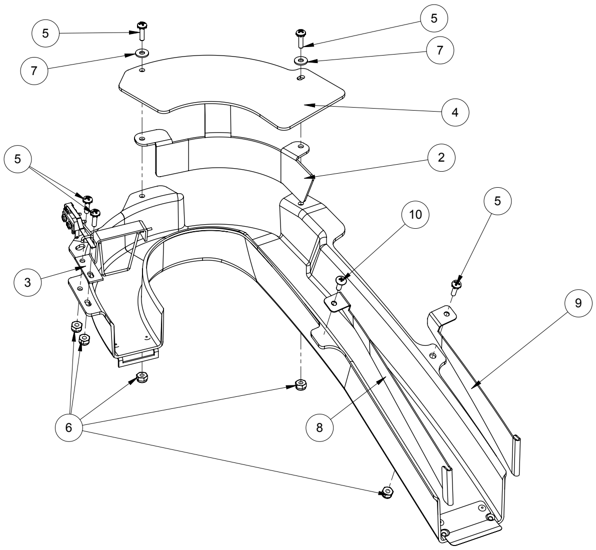
Figure 5.17.3. 515-6549-04-ND Pop bumper bottom bill of materials

ID	Part Number	Description	Qty
1	520-5307-03	POP BUMPER LED MODULE	1
3	545-5197-00	BUMPER BODY	1
4	515-5085-00	RING AND ROD ASSY	1
5	266-5048-00	BUMPER SKIRT COMP SPRING	1
6	545-5195-00	BUMPER BASE	1
7	545-5607-00	BUMPER SKIRT	1

Figure 5.17.1. 515-6459-WN Pop bumper assy top bill of materials

5.18 RIGHT RAMP PRO ASSY

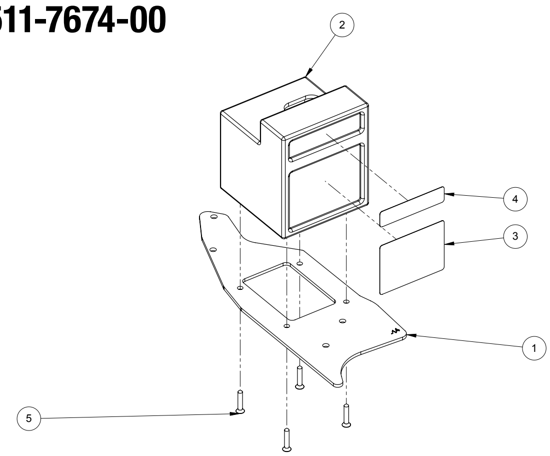
500-9952-00



ID	Part Number	Description	Qty
1	510-7524-00	RIGHT RAMP RIVETED ASSEMBLY PRO	1
2	535-1173-00	STAR PRO RAMP BALL GUIDE	1
3	500-9936-03	GATE ASSEMBLY	1
4	830-7028-51B	BUTYRATE SET - 51B	1
5	232-5202-00	SCREW, 6-32 X 1/2" PPH MS SEMS	5
6	240-5005-00	6-32 NYLON STOP NUT	5
7	242-5001-00	#6 WASHER	2
8	535-1174-00	RIGHT RAMP, LEFT EDGE PROTECTOR	1
9	535-1175-00	RIGHT RAMP, RIGHT EDGE PROTECTOR	1
10	237-5809-00	SCREW, #6 X 1/2" PTH A	1

5.19 AMPLIFIER ASSEMBLY

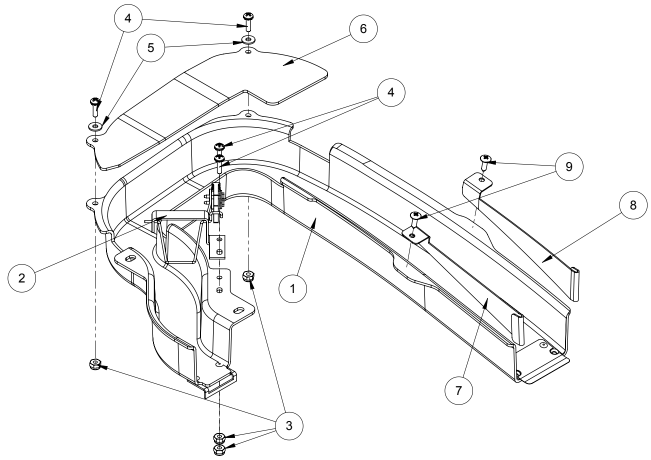
511-7674-00



ID	Part Number	Description	Qty
1	830-7029-14	BUTYRATE SET - 14	1
2	880-6175-00	AMPLIFIER MODEL	1
3	820-8380-33	DECAL SET - 33	1
4	820-8380-34	DECAL SET - 34	1
5	237-5833-00	SCREW, #4 X 5/8" PFH - BLACK	4

5.20 LEFT RAMP ASSY

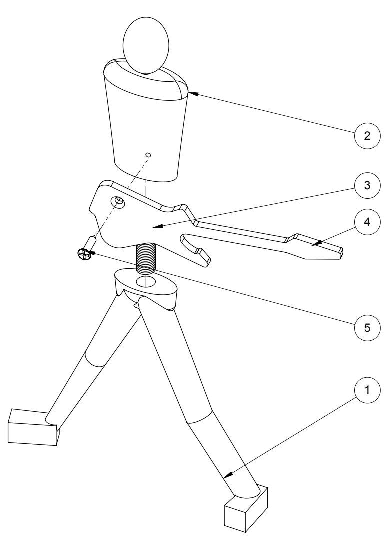
500-9954-00



ID	Part Number	Description	Qty
1	510-7527-00	LEFT RAMP RIVETED ASSEMBLY	1
2	500-9936-01	GATE ASSEMBLY	1
3	240-5005-00	6-32 NYLON STOP NUT	4
4	232-5202-00	SCREW, 6-32 X 1/2" PPH MS SEMS	4
5	242-5001-00	#6 WASHER	2
6	830-7029-50	BUTYRATE SET - 50	1
7	535-1176-00	LEFT RAMP, LEFT EDGE PROTECTOR	1
8	535-1177-00	LEFT RAMP, RIGHT EDGE PROTECTOR	1
9	237-5809-00	SCREW, #6 X 1/2" PTH A	2

5.21 PAUL ASSEMBLY, PRO

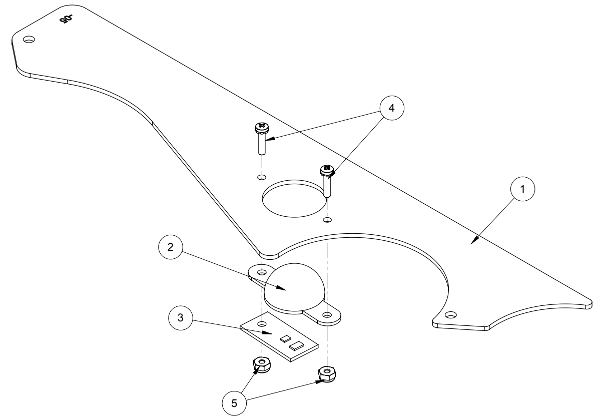
511-7676-00



ID	Part Number	Descripton	Qty
1	880-6177-01	PAUL-LEGS	1
2	880-6172-01	PAUL-TORSO	1
3	265-5078-00	EXTENSION SPRING-NO LOOP	1
4	830-7028-35A	PAUL GUITAR	1
5	237-5840-00	SCREW, #4 X 1/2" PFH AB	1

5.22 PLASTIC FLASH ASSY - 05

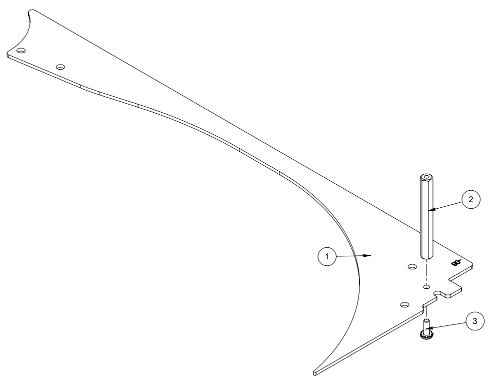
511-7641-05



ID	Part Number	Description	Qty
1	830-7028-05	BUTYRATE SET - 05	1
2	550-5032-07	HAT - ORANGE SB	1
3	520-6785-00	FLASH LAMP PCB	1
4	237-5813-00	SCREW, 4-40 X 1/2" PPH SEMS	2
5	240-5303-00	4-40 NYLON LOCK NUT	2

5.23 PLASTIC ASSY - 06

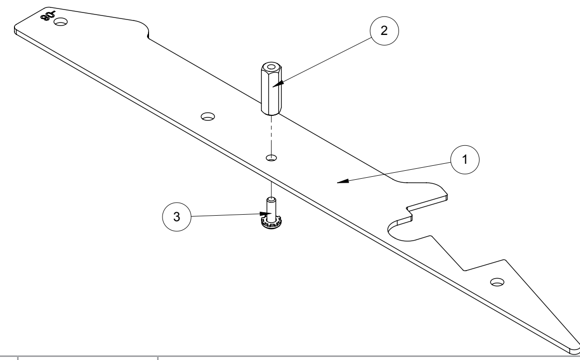
511-7641-06



ID	Part Number	Description	Qty
1	830-7028-06	BUTYRATE SET - 06	1
2	254-5008-32	HEX SPACER - 2 1/8 "	1
3	232-5201-00	SCREW, 6-32 X 3/8" PPH MS SEMS	1

5.24 PLASTIC ASSY - 08

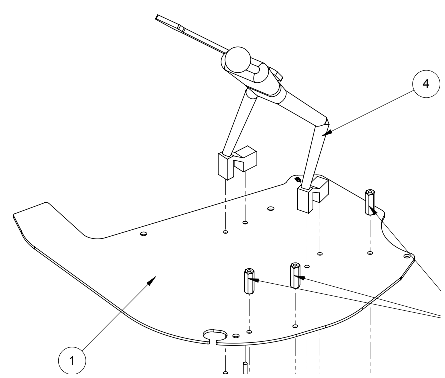
511-7641-08



ID	Part Number	Description	Qty
1	830-7028-08	BUTYRATE SET - 08	1
2	254-5008-04	HEX SPACER - 3/4 "	1
3	232-5201-00	SCREW, 6-32 X 3/8" PPH MS SEMS	1

5.25 PLASTIC ASSY - 09

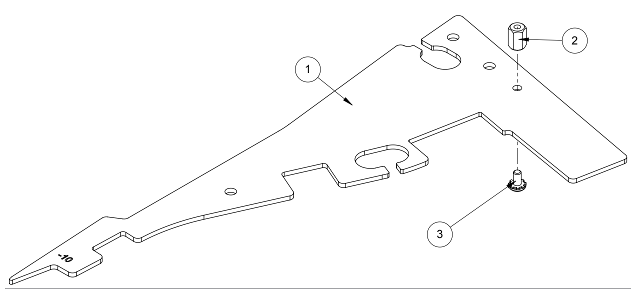
511-7641-09



ID	Part Number	Description	Qty
1	830-7028-09	BUTYRATE SET - 09	1
2	254-5008-04	HEX SPACER - 3/4 "	3
3	232-5201-00	SCREW, 6-32 X 3/8" PPH MS SEMS	3

5.26 PLASTIC ASSEMBLY - 10

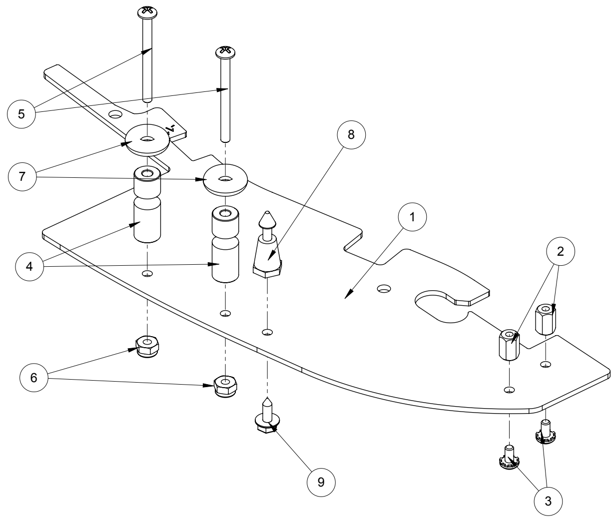
511-7641-10



ID	Part Number	Description	Qty
1	830-7028-10	BUTYRATE SET - 10	1
2	254-5008-12	HEX SPACER - 3/8 "	1
3	232-5200-00	SCREW, 6-32 X 1/4" PPH SEMS	1

5.27 PLASTIC ASSEMBLY - 11

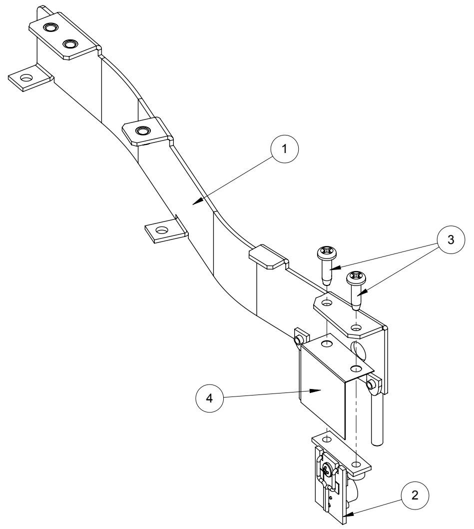
511-7641-11



ID	Part Number	Description	Qty
1	830-7028-11	BUTYRATE SET - 11	1
2	254-5008-12	HEX SPACER - 3/8 "	2
3	232-5200-00	SCREW, 6-32 X 1/4" PPH SEMS	2
4	550-5059-01	PLASTIC POST - CLEAR	2
5	237-5510-00	SCREW, 6-32 X 1-1/2" PPH MS	2
6	240-5005-00	6-32 NYLON STOP NUT	2
7	545-5348-01	3/16 ID RUBBER RING	2

5.28 BALL GUIDE ASSEMBLY - 03

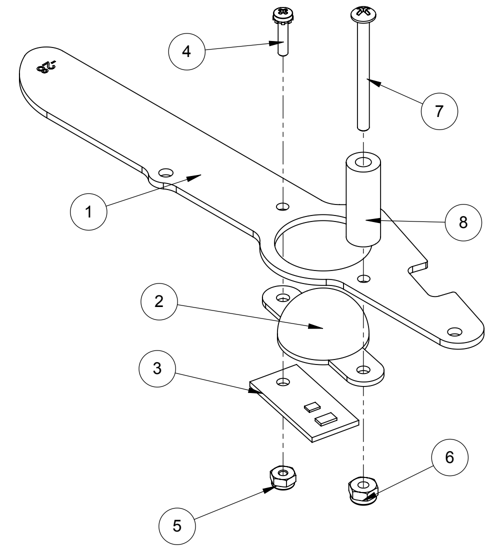
511-7642-03



ID	Part Number	Description	Qty
1	535-1154-03	STAR BALL GUIDE - 03	1
2	515-0215-00	LONG RANGE OPTO EMITTER ASSEMBLY	1
3	237-5880-02	SCREW, #6 X 1/2 PPH T-25	2
4	545-9815-00	OPTO SENSOR PROTECTOR	1

5.29 PLASTIC FLASH ASSEMBLY - 28

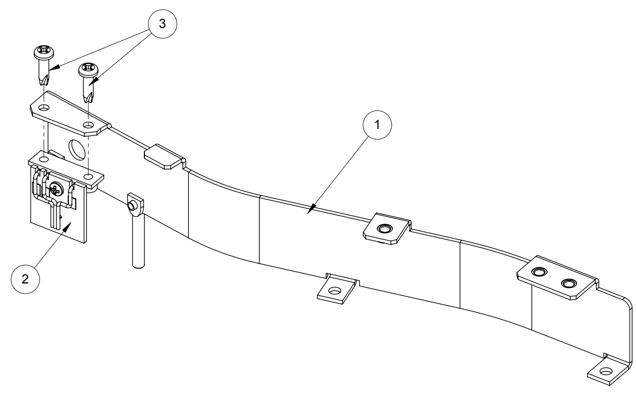
511-7641-28



ID	Part Number	Description	Qty
1	830-7028-28	BUTYRATE SET - 28	1
2	550-5032-07	HAT - ORANGE SB	1
3	520-6785-00	FLASH LAMP PCB	1
4	237-5813-00	SCREW, 4-40 X 1/2" PPH SEMS	1
5	240-5303-00	4-40 NYLON LOCK NUT	1
6	240-5005-00	6-32 NYLON STOP NUT	1
7	237-5510-00	SCREW, 6-32 X 1-1/2" PPH MS	1
8	254-5000-04	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1"	1

5.30 BALL GUIDE ASSEMBLY - 04

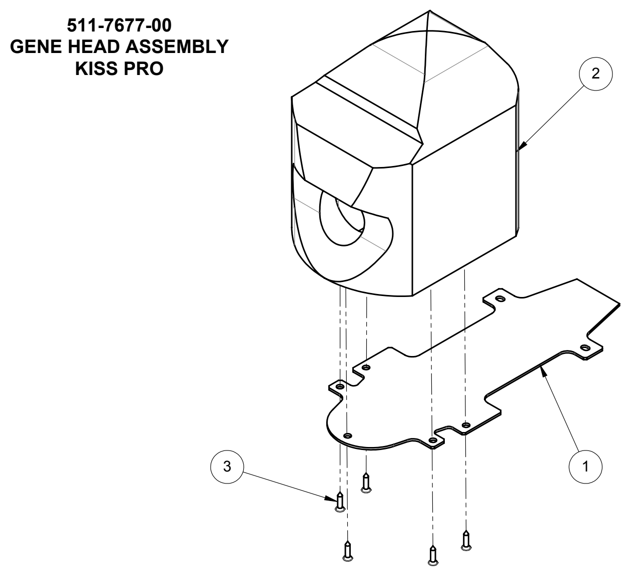
511-7642-04

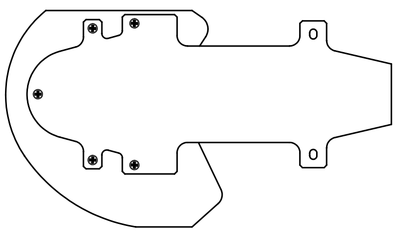


ID	Part Number	Description	Qty
1	535-1154-04	STAR BALL GUIDE - 04	1
2	515-0215-01	LONG RANGE OPTO RECEIVER ASSEMBLY	1
3	237-5880-02	SCREW, #6 X 1/2 PPH T-25	2

5.31 GENE HEAD ASSY

500-7144-03

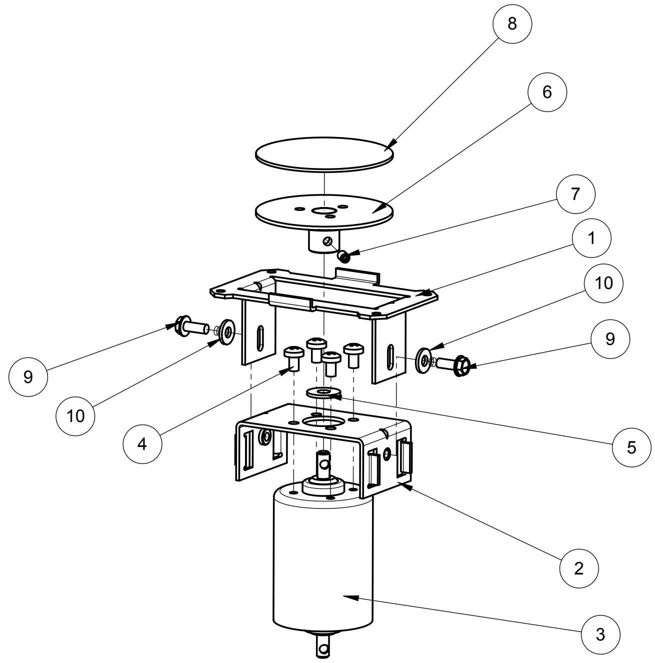




ID	Part Number	Description	Qty
1	535-1180-01	MOUNT PLATE, HEAD, STAR PRO	1
2	880-6171-01	MOLDED GENE HEAD, MODIFIED, STAR	1
3	237-5840-00	SCREW, #4 X 1/2" PFH AB	5

5.32 SPINNING DISK ASSEMBLY

500-7144-03



ID	Part Number	Description	Qty
1	535-0278-02	MOUNTING BRACKET, STAR	1
2	515-7715-02	MOTOR BRACKET, STAR	1
3	511-5190-00	SOLDER ASSY SPINNING DISK MOTOR	1
4	237-6014-00	M5 X 0.8 X 8 PH SELF LOCKING SCREW	4
5	242-5028-00	WASHER NYLON .265 X .688 X .063	1
6	515-7714-02	DISK/HUB WELDMENT, STAR	1
7	237-6092-00	SET SCREW, 10-32 X 5/16, SOCKET CUP PT	1
8	545-9807-00	ADHESIVE PAD - SPINNING DISK , STAR	1
9	237-5995-00	#10-32 x 1/2 HWH NO SLOT SERR ZI	2
10	242-5003-00	#10 FLAT WASHER - 1/2" O.D. X .062 THICK	2

6. SPECIFICATIONS

500-55H1-01

SPECIFICATIONS, MECHANICAL, GAME SETUP

Specification	Imperial	Metric
Weight	210 lbs	96 kg
Max dimensions, leg levelers extended (h, w, d)	78 x 27.75 x 57 in	198 x 70.5 x 145 cm
Minimum game dimensions (h, w, d)	76 x 27.75 x 57 in	193 x 70.5 x 145 cm
Minimum room dimensions per game (h, w, d)	80 x 36 x 84 in	203 x 91 cm x 214 cm

- (h, w, d) = height, width, depth.

SPECIFICATIONS, MECHANICAL, BOXED

Specification	Imperial	Metric
Weight, boxed (without pallet)	230 lbs	105 kg
Box dimensions (h, w, d)	56.5 x 31 x 31 in	144 x 79 x 79 cm
Minimum dimensions (h, w, d)	76 x 26 x 57 in	193 x 66 x 145 cm

- (h, w, d) = height, width, depth.

SPECIFICATIONS, ELECTRICAL

Specification	North America - 120VAC	International - 240VAC
Line Voltage, Nominal	120 VAC	240 VAC
Line Voltage Range	90 VAC - 250 VAC	90 VAC - 250 VAC
Line Frequency *	60 Hz	50 Hz, 60 Hz
Line Power, Current - attract mode	70 W, 0.6 A @ 120 VAC	70 W, 0.3 A @ 240 VAC
Line Power, Current - nominal	360 W, 3 A @ 120 VAC	360 W, 1.5 A @ 240 VAC
Line Power, Current - peak, <100 ms	540 W, 4.5 A @ 120 VAC	540 W, 2.25 A @ 240 VAC

* NOTE: Games designed for 60hz operation (e.g. North America games) will not function correctly on 50hz power and vice versa.

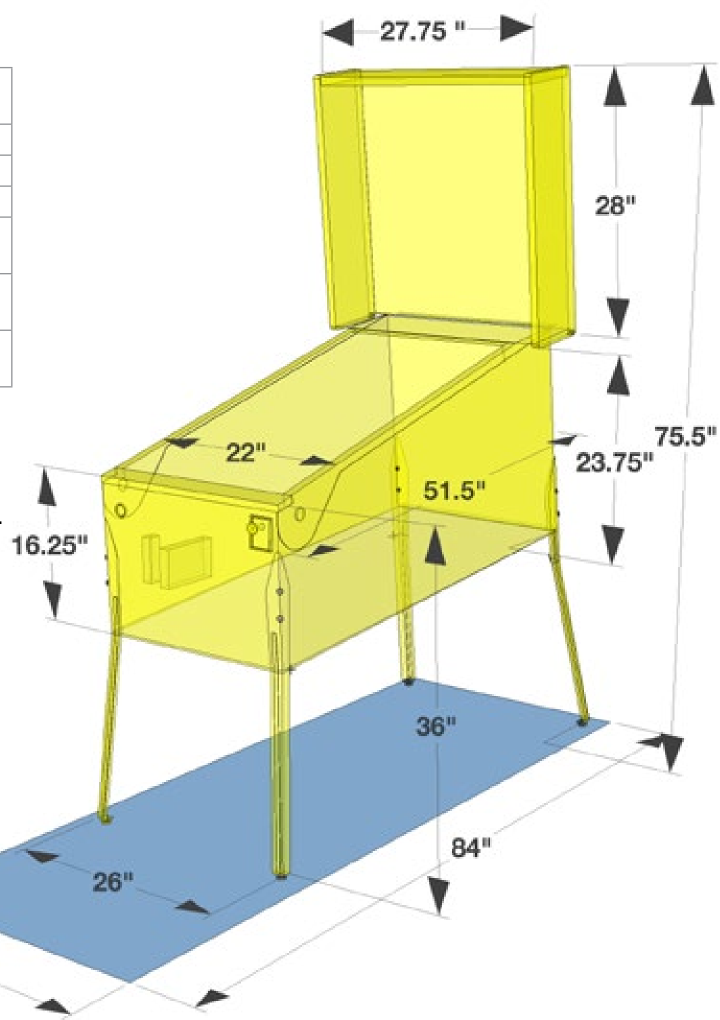
WARNING: Overloading electrical supply circuits is dangerous. Do not overload circuits. To calculate the maximum number of games for a circuit, check circuit amperage rating and divide by the game Nominal Line Power Current rating for your line voltage. For example, a 15A 120V household circuit, 15/3 A (nominal current) = 5 games maximum.

SPECIFICATIONS, ENVIRONMENT

	Minimum	Maximum
Temperature, Operating	32 °F / 0 °C	104°F / 40 °C
Temperature, Storage	32 °F / 0 °C	104°F / 40 °C
Relative Humidity, Operating	5%	95% non-condensing
Relative Humidity, Storage	5%	95% non-condensing

- (a) "The appliance has to be placed in a horizontal position."
- (b) "This appliance is not to be cleaned by a Water Jet."
- (i) "Do not locate this appliance in an area where a Water Jet is used."
- (ii) "Do not clean this appliance with a Water Jet."
- (b) If the supply cord is damaged, it must be replaced in order to avoid a hazard.

6.1 GAME DIMENSIONS



7. WARRANTY

Stern Pinball machines are assembled in Melrose Park, Illinois, USA; each pinball machine has unique characteristics that make it a one-of-a-kind American-made product. Each machine will have variations in appearance resulting from differences in the machine's particular wood parts, individual silk screened art and mechanical assemblies. Stern Pinball has inspected each game element to insure it meets stringent quality and playability standards.

STERN PINBALL INC LIMITED WARRANTY

Stern Pinball Inc ('SELLER') warrants only to the initial purchaser of its products that the items listed below are free from defects in material and workmanship under normal use and service for the **warranty period specified:**

- Printed circuit boards (game logic): 2 months
- Dot Matrix Display boards: 9 months

No other parts of seller's product are warranted. Warranty periods are effective from the initial date of shipment from seller to its authorized distributors.

Seller's sole liability shall be, at its option, to repair or replace products which are returned to seller during the warranty periods specified, provided:

1. Seller is notified promptly upon discovery by purchaser that stated products are defective.
2. Such products are properly packaged and then returned freight prepaid, to seller's plant.

This warranty does not apply to any parts damaged during shipment and/or due to improper handling, or due to improper installation or usage, or alteration. In no event shall the seller be liable for any anticipated profits, loss of profits, loss of use, accidental or consequential damages, or any other losses incurred by the customer in connection with the purchase of a Stern Pinball Inc Product.

WARRANTY DISCLAIMER

Except as specifically provided in a written contract between seller and purchaser, there are no other warranties, express or implied, including any implied warranties of merchantability or fitness for a particular purpose.

7.1 WARNINGS, COMPLIANCE, AND LEGAL NOTICES

500-55D7-01 Whoa Nellie Big Juicy Melons

For safety and reliability, substitute parts and equipment modifications are not recommended (and may void any warranties).

Use of non-Stern® Pinball Inc. parts or modifications of game circuitry, may adversely affect game play, or may cause injuries. Transport pinball games with hinged backbox in the down position only! Always take great care when servicing any game. Always read the service manual before replacing or servicing components. SUBSTITUTIONS OF PARTS OR EQUIPMENT MODIFICATIONS may void FCC Type acceptance.

Always disconnect the line voltage before servicing. Some parts may still hold current when unplugged.

WARNING

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a class a computing device pursuant to SUBPART J OF PART 15 OF FCC RULES, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

RF INTERFERENCE NOTICE: Cable harness placements and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC rules. To maintain these levels, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

"The appliance has to be placed in a horizontal position."

"This appliance is not to be cleaned by a Water Jet."

603335-7.12.1 (i) "Do not locate this appliance in an area where a Water Jet is used." (ii) "Do not clean this appliance with a Water Jet." 60335-7.12.5 (b) If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

IEC 60825-1 2ND EDITION AND WAS ISSUED IN 2007

NOTICES



1-800-KICKERS

PARTS.SERVICE@STERNPINBALL.COM
WWW.STERNPINBALL.COM
FACEBOOK.COM/STERNPINBALL

KISS PRO MODEL #500-55H1-01
MANUAL PART #780-50H1-01
07/07/15 EDITION